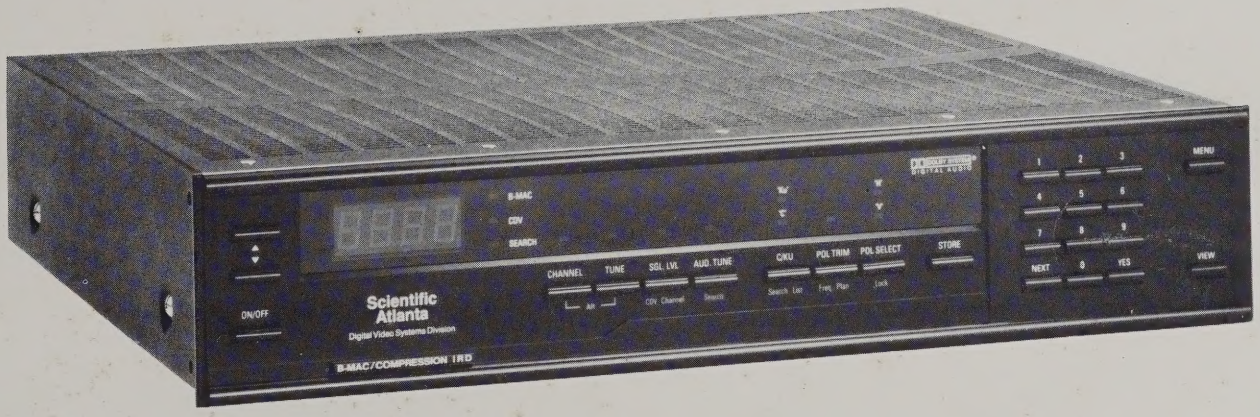
MODEL 9708
B-MAC/COMPRESSION INTEGRATED RECEIVER/DECODER
OPERATOR'S MANUAL
FOR BUSINESS TELEVISION NETWORKS



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Digital Video Systems Division

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MODEL 9708
B-MAC/COMPRESSION INTEGRATED RECEIVER/DECODER FOR BUSINESS TELEVISION NETWORKS

OPERATOR'S MANUAL

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REVISION HISTORY

ISSUE	CHANGES
1 (03/92)	------
1A (06/92)	ECN 003-522.
1B (09/92)	ECN 003-574.
1C (12/92)	ECN 003-606.

The lightning flash with arrowhead symbol, within an equilateral triangle, is intended to alert you to the presence of uninsulated "dangerous voltage" within the product's enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons.

CAUTION

RISK OF ELECTRIC SHOCK DO NOT OPEN

The exclamation point within an equilateral triangle is intended to alert you to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the product.

The above caution symbols are located on the rear panel of the unit

CAUTION

TO REDUCE THE RISK OF ELECTRIC SHOCK, DO NOT REMOVE COVERS FROM THIS UNIT. NO USER-SERVICEABLE PARTS INSIDE. REFER SERVICING TO QUALIFIED PERSONNEL. SEE ADDITIONAL SAFETY INSTRUCTIONS BELOW.

WARNING

TO REDUCE THE RISK OF FIRE OR ELECTRIC SHOCK, DO NOT EXPOSE THIS PRODUCT TO RAIN OR MOISTURE.

CAUTION

TO PREVENT ELECTRICAL SHOCK, MATCH WIDE BLADE OF PLUG TO WIDE SLOT, FULLY INSERTED.

ATTENTION

POUR EVITER LES CHOCS ELECTRIQUES, INTRODUIRE LAME LA PLUS LARGE DE LA FICHE DANS LA BORNE CORRESPONDANTE DE LA PRISE ET POUSSER JUSQU'AU FOND.

IMPORTANT SAFEGUARDS

1. **Read Instructions** - All the safety and operating instructions should be read before this product is operated.
2. **Retain Instructions** - The safety and operating instructions should be retained for future reference.
3. **Heed Warnings** - All warnings on the product and in the operating instructions should be adhered to.
4. **Follow Instructions** - All operating and use instructions should be followed.
5. **Cleaning** - Unplug this product from the wall outlet before cleaning. Do not use liquid cleaners or aerosol cleaners. Use a damp cloth for cleaning.
6. **Attachments** - Do not use attachments not recommended by Scientific-Atlanta as they may cause hazards.
7. **Water and Moisture** - Do not use this product near water - for example, near a bath tub, wash bowl, kitchen sink, or laundry tub, in a wet basement, or near a swimming pool, and the like.
8. **Accessories** - Do not place this product on an unstable cart, stand, bracket, or table. The product may fall causing serious injury to a child or adult, and serious damage to the product. Use only with a cart, stand, bracket, or table recommended by Scientific-Atlanta. Any mounting of the product should follow the instructions, and should use a mounting accessory recommended by Scientific-Atlanta.

8A. An appliance and cart combination should be moved with care. Quick stops, excessive force, and uneven surfaces may cause the appliance and cart combination to overturn.

PORTABLE CART WARNING

9. **Ventilation** - Slots and openings in the cabinet are provided for ventilation and to ensure reliable operation of the product, and to protect it from overheating. These openings must not be blocked or covered. The openings should never be blocked by placing the product on a bed, sofa, rug, or other similar surface. This product should not be placed in a built-in installation such as a bookcase or rack unless proper ventilation is provided or the instructions have been adhered to.

10. **Heat** - This product should be located away from heat sources such as radiators, heat registers, stoves or other products (including amplifiers) that radiate heat.

11. **Power Sources** - This product should be operated only from the type of power source indicated on the marking label. If you are not sure of the type of power supply in your home or business, consult your appliance dealer or local power company. For products intended to operate from battery power, or other sources, refer to the operating instructions.

12. **Grounding** - This product is equipped with a 3-wire grounding-type plug, a plug having a third (grounding) pin. This plug is a safety feature. If you are unable to insert the plug into the outlet, contact your electrician to replace your obsolete outlet. Do not defeat the safety purpose of the grounding-type plug.

13. **Power-Cord Protection** - Power-supply cords should be routed so that they are not likely to be walked on or pinched by items placed upon or against them, paying particular attention to cords at plugs, convenience receptacles, and the point where they exit from the appliance.

14. **Lightning** - For added protection for this product during a lightning storm or when it is left unattended and unused for long periods of time, unplug it from the wall outlet and disconnect the antenna or cable system. This will prevent damage to the product due to lightning and power-line surges.

15. **Power Lines** - An outside antenna system should not be located in the vicinity of overhead power lines or other electric light or power circuits, or where it can fall into such power or circuits. When installing an outside antenna system, extreme care should be taken to keep from touching such power lines or circuits as contact with them might be fatal.

16. **Overloading** - Do not overload wall outlets, extension cords or integral convenience receptacles, as this can result in a risk of fire or electric shock.

17. **Object and Liquid Entry** - Never push objects of any kind into this product through openings as they may touch dangerous voltage points or short-out parts that could result in a fire or electric shock. Never spill liquid of any kind on the product.

18. **Servicing** - Do not attempt to service this product yourself as opening or removing covers may expose you to dangerous voltage or other hazards. Refer all servicing to qualified service personnel.

19. **Damage Requiring Service** - Unplug this product from the wall outlet and refer servicing to qualified service personnel under the following conditions:
    a. When the power-supply cord or plug is damaged.
    b. If liquid has been spilled, or objects have fallen into the product.
    c. If the product has been exposed to rain or water.
    d. If the product does not operate normally by following the operating instructions. Adjust only those controls that are covered by the operating instructions as an improper adjustment of other controls may result in damage and will often require extensive work by a qualified technician to restore the product to its normal operation.
    e. If the product has been dropped or damaged in any way.
    f. When the product exhibits a distinct change in performance - this indicates a need for service.

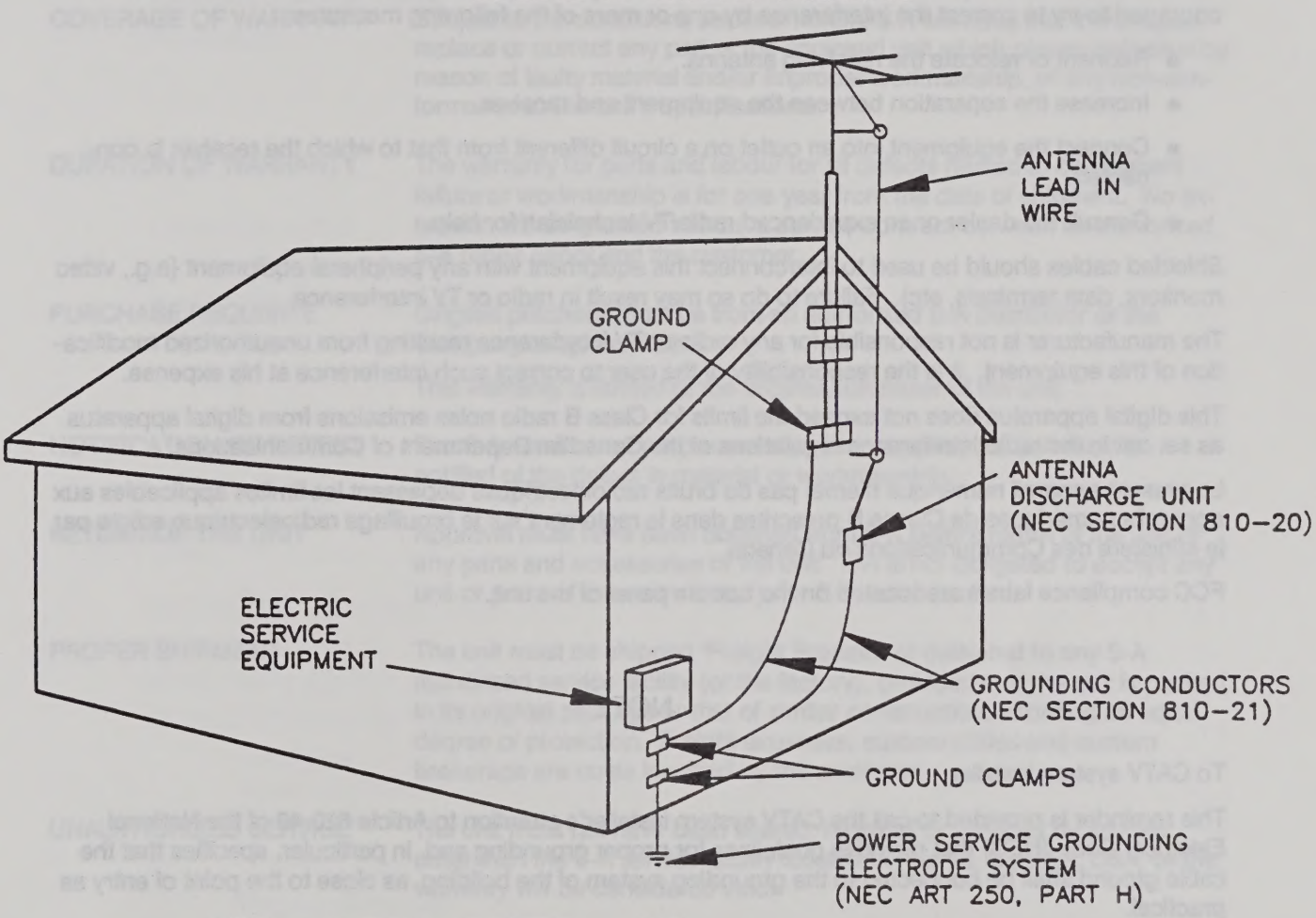
20. **Replacement Parts** - When replacement parts are required, be sure the service technician has used replacement parts specified by Scientific-Atlanta or have the same characteristics as the original part. Unauthorized substitutions may result in fire, electric shock or other hazards.

21. **Safety Check** - Upon completion of any service or repairs to this product, ask the service technician to perform safety checks to determine that the product is in safe operating condition.

22. **Outdoor Antenna Grounding** - If an outside antenna or cable system is connected to the product, be sure the antenna or cable system is grounded so as to provide some protection against voltage surges and built-up static charges. Appropriate sections of the National Electrical Code, NFPA 1990, provide information with respect to proper grounding of the mast and supporting structure, grounding of the lead-in wire to an antenna discharge unit, size of grounding conductors, location of antenna-discharge unit, connection to grounding electrodes, and requirements for the grounding electrode. See the figure on the next page.

TEXT OF REVISED FIGURE 75.1 IN THE THIRD EDITION OF THE STANDARD FOR LOW-VOLTAGE VIDEO PRODUCTS WITHOUT CRT DISPLAYS, UL 1409

FIGURE 75.1
EXAMPLE OF ANTENNA GROUNDING


ANTENNA LEAD IN WIRE
GROUND CLAMP
ANTENNA DISCHARGE UNIT (NEC SECTION 810-20)
ELECTRIC SERVICE EQUIPMENT
GROUNDING CONDUCTORS (NEC SECTION 810-21)
GROUND CLAMPS
POWER SERVICE GROUNDING ELECTRODE SYSTEM (NEC ART 250, PART H)

NEC - NATIONAL ELECTRICAL CODE

Revised Figure 75.1 effective October, 1, 1990

WARNING

This equipment has been tested and found to comply with the limits for a TV interface device pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when operated in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions supplied in this Manual, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful inrterference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Shielded cables should be used to interconnect this equipment with any peripheral equipment (e.g., video monitors, data terminals, etc). Failure to do so may result in radio or TV interference.

The manufacturer is not responsible for any radio or TV interference resulting from unauthorized modification of this equipment. It is the responsibility of the user to correct such interference at his expense.

This digital apparatus does not exceed the limits for Class B radio noise emissions from digital apparatus as set out in the radio interference regulations of the Canadian Department of Communications.

Le present appareil numerique n'emet pas de bruits radioelectriques depassant les limites applicables aux appareils numeriques de Classe B prescrites dans le reglement sur le brouillage radioelectrique edicte par le Ministere des Communications du Canada.

FCC compliance labels are located on the bottom panel of the unit.

NOTE

To CATV system installer:

This reminder is provided to call the CATV system installer's attention to Article 820-40 of the National Electrical Code (NEC) that provides guidelines for proper grounding and, in particular, specifies that the cable ground shall be connected to the grounding system of the building, as close to the point of entry as practical.

Manufactured under one or more of the following U.S. patents: 4,642,688; 4,584,599; 4,641,181; 4,652,903; 4,719,642; 4,651,208; 4,697,277; 4,698,598; 4,484,027; 4,620,224; and other patents pending.

WARRANTY CONDITIONS

Scientific-Atlanta Inc., Digital Video Systems Division, hereafter, S-A, warrants the Purchaser that each new unit is free of defects due to faulty material and/or workmanship and that it will be the quality designated and described by S-A.

TERMS OF WARRANTY

COVERAGE OF WARRANTY	Subject to the conditions set forth herein, S-A warrants that it will repair, replace or correct any part of the enclosed unit which proves defective by reason of faulty material and/or improper workmanship, or any non-conformance to the unit's specifications.
DURATION OF WARRANTY	The warranty for parts and labour for all defects related to component failure or workmanship is for one year from the date of shipment. No extension will be granted without a service contract between an authorized S-A repair depot and the customer.
PURCHASE REQUISITE	Original purchase must be from an authorized S-A distributor or the Company's representative. This warranty is limited to the original purchaser of the unit.
NOTIFICATION OF DEFECT	The S-A distributor or representative who supplied the unit must be notified of the defect in material or workmanship.
RETURN OF THE UNIT	Approval must have been obtained from S-A before return of the unit or any parts and accessories of the unit. S-A is not obligated to accept any unit or parts of the unit without prior S-A authorization.
PROPER SHIPMENT	The unit must be shipped "Freight Prepaid" or delivered to any S-A authorized service facility (or the factory), provided that the unit is packed in its original package or that of similar construction, affording an equal degree of protection. Freight expenses, custom duties and custom brokerage are costs incurred by the customer.
UNAUTHORIZED SERVICE	The unit must not have been altered, repaired or serviced by anyone other than the S-A service facility located in Atlanta, Georgia, USA, or the warranty will be considered void.
MISUSE, ACCIDENT, ABUSE, ETC.	The unit must not have been subjected to change, or alteration due to accident, failure caused by war or acts of God, misuse, improper maintenance, change of serial number, or operated contrary to the instructions contained in the instruction manual.

Scientific-Atlanta reserves the right to make any improvements on its products or parts without assuming any obligation to install them in previously manufactured units. No liability is assumed by S-A for any collateral or consequential damages or losses associated with its product.

For any unit or subassembly returned for repairs under warranty conditions and found to have no fault(s), the customer will be charged for the time spent.

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INTRODUCTION

ABOUT THIS MANUAL

This manual describes how to install and operate the Model 9708 B-MAC/Compression Integrated Receiver/Decoder (IRD) for Business Television (BTV) applications. It also contains user service and maintenance procedures. Service problems not covered in this manual should only be handled by qualified service technicians.

GENERAL DESCRIPTION

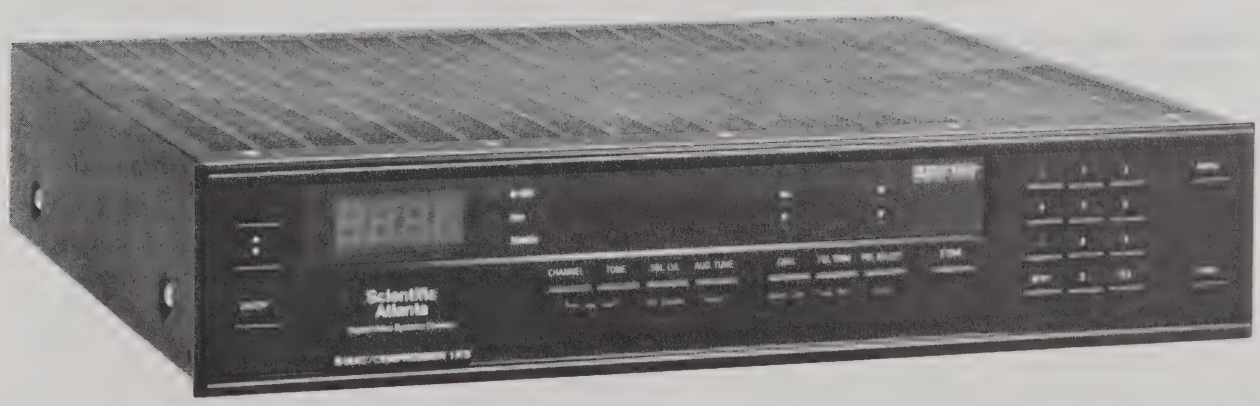
The Model 9708 IRD, as shown in the figure below, is a compression-ready, satellite video receiver with a built-in B-MAC[1] decoder. It is available in both 525-line NTSC and PAL-M, and 625-line compatible models. The NTSC unit is capable of receiving video signals encoded in the 525-line B-MAC format or in standard NTSC format, while the PAL-M model receives video in the PAL-M format. The 625-line unit has a PAL-B/G/H/I compatible output. A high-speed, error-corrected, utility data/reassigned data channel is provided as a standard feature.

This unit is designed for both tabletop and rack-mount operation. The microcomputer-based unit provides ease of installation and operation using the front panel pushbutton switches and indicators. It is fully programmable and is available with a number of pre-programmed frequency plans. A frequency plan is also provided that can be tailored to customer defined settings (C or Ku Band).

The bypass option provides automatic switching between B-MAC and NTSC, PAL-B or PAL-M depending on the signal format being received. When operating in B-MAC mode, the IRD supports Y/C and NTSC/PAL outputs, two-channel Dolby[2] digital stereo audio, video teletext, a 9600 baud, error-corrected, utility data or 19.2 kB reassigned data channel, and eight remote-controlled output signals. Two balanced audio channels or a VHF modulator is also available as an option.

The IRD is intended for use in private satellite video networks using the B-MAC encryption format. It is designed to accept an IF signal from a C-band or Ku-band, low-noise, block downconverter (LNB) with a frequency range of 950-1450 MHz.

A user-friendly menu system is provided to control viewing of broadcasts in BTV, CATV and SMATV headend applications.



Integrated Receiver/Decoder

FEATURES

Features included in the unit are as follows:

- Receives analog B-MAC, NTSC or PAL-M in 525-line systems, or PAL-B/G/H/I in 625-line systems, and compressed digital video signals (with module installed).
- Optional NTSC, PAL-M or PAL-B bypass with automatic switching between B-MAC and NTSC or PAL (clear modes). This allows for the reception of non-encrypted transmission signals (single-channel audio subcarrier only).
- VQ compression module adaptability.
- Time Division Multiplex (TDM) or Frequency Division Multiplex (FDM) compatible in compression.
- Wide aspect ratio (16 x 9) compatible.
- A composite baseband output (non-de-emphasized).
- An optional RF modulator.
- VCR copy protection for 525-line B-MAC signals. The uplink B-MAC Encoder requires modification to provide this feature. Contact your dealer for more information.
- Automatic B-MAC channel search capability.
- Teletext captioning.
- An output interface for both polar rotor and Horizontally/Vertically (H/V) switched polarizers.
- Two standard B-MAC decoded audio channels.
- Two optional, balanced, baseband audio outputs with adjustable gain for connection to a cable headend or external modulator.
- A utility data/reassigned data output.
- Smart card receptacle for enhanced security.
- Up to 99 fully programmable channels, tuned and selected by front panel pushbutton switches.
- Eight output switches to control external devices.
- Diagnostics and tuning control via the front panel or a remote serial interface.

[1] Registered Trademark of Scientific-Atlanta Inc.
[2] Registered Trademark of Dolby Laboratories Inc.

SPECIFICATIONS

All of the following parameters are specified using an RF input carrier, FM deviation of 24.5 MHz p-p with 9dB MAC pre-emphasis, unless otherwise specified.

L-BAND RF INPUT

Input Level	-70 dBm to -30 dBm per carrier.
Frequency Range	950 MHz to 1450 MHz in 100 kHz steps.[1]
IF Bandwidth	28 MHz.
Channel Selection	Up to 99 fully programmable channels, tuned and selected by front panel pushbutton switches.
Tuning Step Size	100 kHz.
Impedance	75 ohms.
Polarization Selection	Programmable external RF H/V switch or mechanical servo polarizer.

VIDEO OUTPUTS

Output Level at 24.5MHz p-p deviation	1.0V p-p ±5%.
Frequency Response NTSC PAL	 ±2.0 dB, 15 kHz to 3.5 MHz, -3 dB at 4.2 MHz. ±2.0 dB, 15 kHz to 4.0 MHz, -3 dB at 5.0 MHz.
Output Impedance	75 ohms.

AUDIO OUTPUTS

No. of Channels	Two standard, unbalanced.
Output Level	400mV RMS into 600 ohms (nominal). Optional, balanced, adjustable audio outputs are factory set for unity gain (0 dBm out for 0 dBm in).
Frequency Response	±2.0 dB, 20 Hz to 15 kHz.
Load Impedance	600 ohms minimum.

[1] To ensure reliable operation, the local oscillator accuracy stability of the LNB must not exceed 2 MHz.

AC POWER REQUIREMENTS

Line Frequency	47 Hz - 63 Hz.
Voltage[2]	Factory set to 100V, 120V, 220V, or 240 VAC ±10%.
Power Consumption	90W maximum.
Fuse Rating	1.25A/250V, fast-blow type.

ENVIRONMENTAL CONDITIONS

Operating Temperature	25°C (77°F) nominal.
Relative Humidity	5% to 90% non-condensing.
Storage Temperature	-40°C (-40°F) to +60°C (140°F).

PHYSICAL CHARACTERISTICS

Dimensions (HxWxD)	3.6 in. (8.6 cm)(w/o rubber feet) x 17.5 in. (44.5 cm) (19.0 in. (48.3 cm) w/handles) x 15.3 in. (38.9 cm). Chassis is 2 units high, capable of being mounted in an EIA standard 19-inch wide rack.

2 Each unit is factory configured for only one value of the mains AC voltage, as indicated on the rear panel adjacent to the power supply cord entry.

INSTALLATION

UNPACKING AND INSPECTION

Upon receipt of the IRD, check for signs of damage to the outer casing. If any signs of damage are evident, be sure to notify the carrier before accepting the consignment. Notify your S-A representative at once if there are any defects or damage.

This unit has been thoroughly tested and inspected, both electrically and mechanically, to meet the specifications listed.

NOTE

Please retain the original packing material in case the unit must be returned for repair. Damages incurred due to the use of packing materials that do not meet S-A specifications will result in the customer being responsible for all shipping and repair charges.

MOUNTING

The IRD is configured for tabletop applications. Care must be taken, however, to select a dry, well ventilated location to allow proper air circulation in and around the unit. Also sufficient clearance should be available behind the unit to allow for connection of input/output and power cables.

WARNING

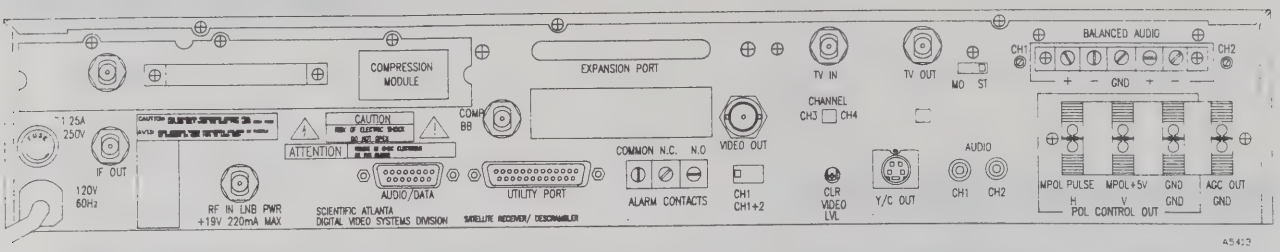
Do not obstruct the ventilation holes in the top panel of the chassis. Prolonged operation with the holes covered could result in damage to the unit.

Where rack mounting is required, the installer should configure the unit as follows:

1. Attach both rack mounting brackets/handles (optional) to the IRD using the six screws supplied.
2. Remove the four rubber feet from the bottom of the unit.
3. Install rack shelves in the rack to support the IRD.
4. Install the IRD into the rack and secure with the appropriate screws (not supplied).

REAR PANEL CONNECTIONS

Input and output connections are made at the rear of the unit, and are summarized in table 3.3. Refer to the following figure for a rear panel illustration. This diagram shows an example of a 120V, 60Hz unit. Other units are labelled according to their specific voltage requirements.



Rear Panel

Rear Panel Controls and Connectors

CONTROL/CONNECTOR	TYPE	FUNCTION/DESCRIPTION
AC IN	NEMA 5-15p	Voltage input, factory set to 100V, 120V, 220V or 240 VAC ±10%.
RF IN	F	This is the connection for the signal received from the LNB. It also provides the DC voltage to power an LNB.
CHANNEL (optional) CH3/CH4	Slide Switch	Selects the TV OUT VHF frequency in NTSC systems.
TV IN (optional)	F	Connection to the Off-Air antenna or Cable television signal. It is automatically routed to TV OUT when IRD is OFF or AC power is removed. Not available with Balanced Audio option.
TV OUT (optional)	F	Connection to the TV or VCR antenna input. The Channel Select switch controls the output frequency. Not available with the Balanced Audio option.
EXPANSION PORT	Smart card	Slot for smart card, a future option to provide upgradeable security codes.
COMPRESSION MODULE (optional)	Module	Compression module, a future option compatible with S-A video compression format.
IF OUT	F	A 612 MHz loop providing access to the IF signal. The IF loop supplied with the IRD must be connected between these two F connectors when the compression module is installed.
CH1, CH1 + 2	Slide Switch	Selects the B-MAC audio output to the VHF modulator (when installed). **CH1** selects B-MAC Audio Channel 1, while **CH1 + 2** selects the sum (monaural) output of B-MAC Audio Channels 1 + 2.
CLR VID LVL	Trimpot	Adjusts the video output level when the IRD is receiving an NTSC, PAL-M or PAL-B signal. This has no effect when the IRD is in B-MAC mode.
VIDEO OUT	BNC	Provides a a video output for connection to a video monitor, cable headend or external modulator.

Rear Panel Controls and Connectors

CONTROL/CONNECTOR	TYPE	FUNCTION/DESCRIPTION
COMP BB	F	Normal or inverted baseband video output (with pre-emphasis).
Y/C OUT		Component video in Y/C format.
AUDIO	RCA phono	Unbalanced baseband audio outputs for use with an external video monitor, audio amplifier, or modulator.
BALANCED AUDIO OUT (optional)	Terminal	Balanced baseband audio outputs (CH1, CH2) each with adjustable gain controls for use with an external audio amplifier, cable headend or external modulator.
MOno, STereo	Switch	Selects the Balanced Audio output as either mono or stereo audio. When the switch is in the STereo position, stereo audio (CH1, CH2) is available at the CH1 and CH2 output terminals (screw terminal strip). When the switch is in the MOno position, both channels are combined (CH1 + CH2) to provide mono audio outputs at CH1 and CH2.
CH1, CH2	Trimpot	Adjusts the CH1 and CH2 balanced audio output level, factory set to 0 dBm out for 0 dBm in.
ALARM CONTACTS	Terminal	Three-wire connector designed to connect to a redundancy switch such as the S-A Decoder Changeover Switch. In the event of an error condition in the IRD (e.g., loss of B-MAC signal or unit not authorized) or selection of a non-video service, an alarm is sent to the redundancy switch to switch to the output from a secondary (standby) IRD.
UTILITY PORT	DB25F	Multiple function connector supporting utility data (up to 9600 baud, asynchronous) or reassigned data (up to 19.2kB, asynchronous), eight auxiliary remote control outputs, and computer diagnostics and remote tuning control.
AUDIO/DATA	DB15F	Connection for an audio/data channel expansion unit.
POL CONTROL H, V, GND	Terminal	Electrical polarization control outputs for use with a pin-diode RF polarization switch.
MPOL PULSE, MPOL, +5V, GND	Terminal	Mechanical polarization control outputs for use with a servo-type polarizer (polar rotor).
AGC OUT	Terminal	Provides an output voltage proportional to the RF input signal level.

OUTPUT CONNECTOR CONFIGURATIONS

Output connectors consist of F, phono, BNC, terminal and D-type connectors. These connectors are self-explanatory. However, the UTILITY PORT and BALANCED AUDIO output (optional) connectors are multi-pin devices that require pinout explanation. The tables below list the pinouts for these connectors.

For continuous FCC compliance of the IRD when using the UTILITY PORT output, use a shielded cable for connection to a peripheral device.

Utility Port

The UTILITY PORT connector is a 25-pin D type. It is a multi-function connector that provides utility data (up to 9600 baud, asynchronous) or reassigned data (up to 19.2kB, asynchronous), eight remote control ports, and computer diagnostics and remote tuning control.

UTILITY PORT Pinout

PIN	SIGNAL	PIN	SIGNAL
1	Chassis Ground	15	Not connected
2	Reassigned Data/Utility Data Output	16	Remote Control Output 8
3-6	Not connected	17	Remote Control Output 7
7	Signal Ground	18	Remote Control Output 6
8	Not connected	19	Remote Control Output 5
9	Not connected	20	Not connected
10	B-MAC Not Authorized Flag	21	Control Output Pullup: +5V via 47 ohms
11	Not connected	22	Remote Control Output 4
12	Remote Serial Interface Data Receive	23	Remote Control Output 3
13	Remote Serial Interface Data Transmit	24	Remote Control Output 2
14	Not connected	25	Remote Control Output 1

Pin 10 is low (open collector input) when the IRD is authorized and receiving a B-MAC signal.

All outputs are open-collector type, controlled when the IRD is in the B-MAC Mode. When the IRD is receiving an NTSC signal, only **Control Output Pullup** is functional.

When using pins 12 and 13 to transmit and receive diagnostic or tuning control commands and information, request the "Model 9708 IRD Remote Serial Interface Communications Protocol Specification" from Scientific-Atlanta for more information.

Audio/Data Port

The AUDIO/DATA expansion feature will be available in future as an option.

Balanced Audio Output (optional)

The two-channel, BALANCED AUDIO output is available on a standard A-terminal connector with the output level externally adjustable. All units are factory set to 0 dBm out for 0 dBm in.

BALANCED AUDIO OUTPUT Pinout

PIN	SIGNAL
1	CH1 +
2	CH1-
3	Ground
4	CH2 +
5	CH2-

Note: These audio outputs are balanced low-impedance signals, both normal and inverted signals driven by active devices. For single-ended operation, connection should be made between + and Ground (GND). The unused signal must NOT be grounded.

SYSTEM INTERCONNECTIONS

This section contains instructions for connecting the IRD to a either a single or dual LNB system.

Single LNB System

In a single LNB system, both the vertically polarized signals and the horizontally polarized signals are transmitted from the LNB to the RF IN connector via a single coaxial cable. Polarization is selected on the front panel of the IRD using the POL SEL button. Refer to the figure on the next page when connecting the IRD to a single LNB.

CAUTION

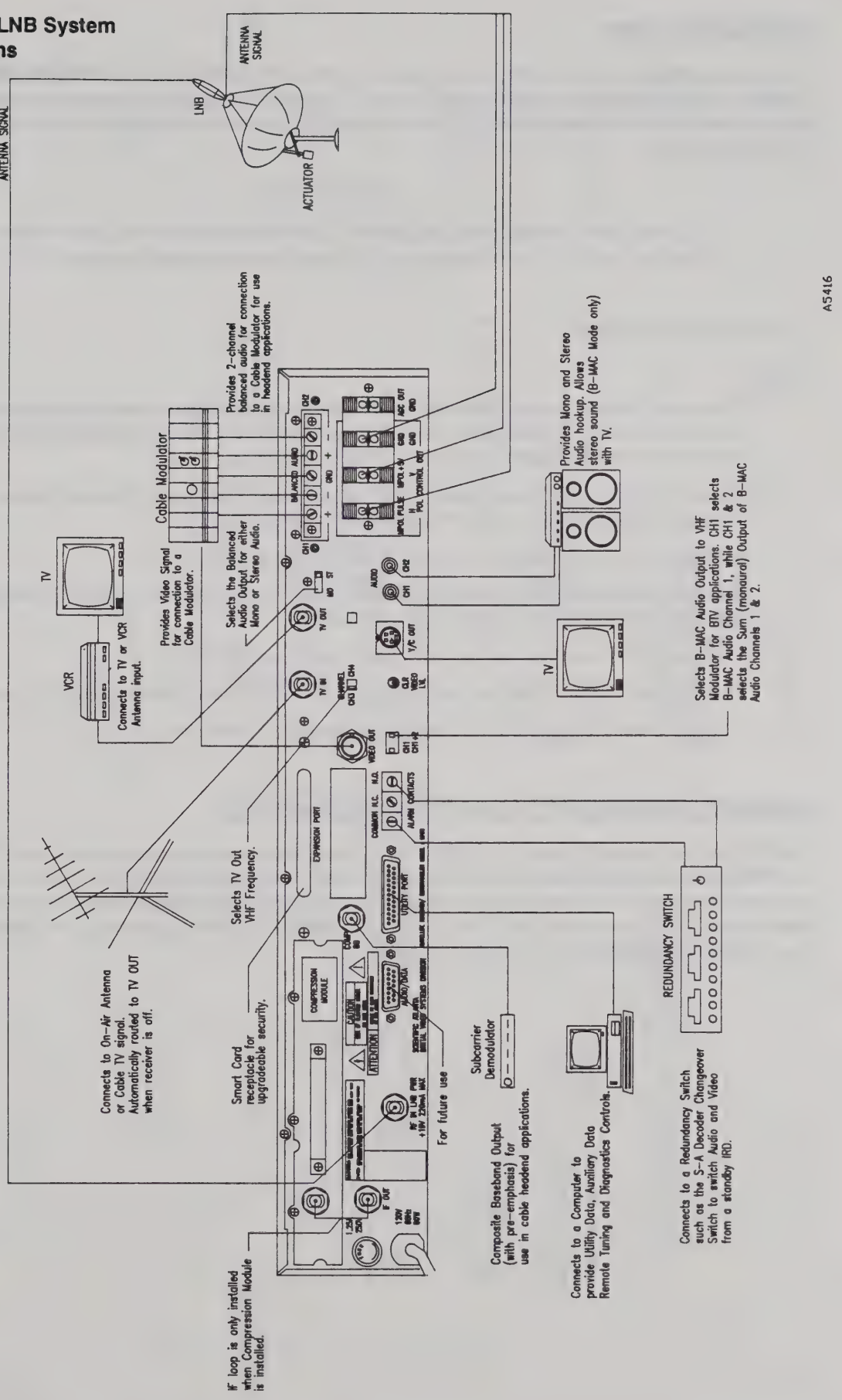
DC voltage is always present at the RF IN connector when AC power is supplied to the IRD.

Connect the IRD as follows:

Step

1. Connect the 75-ohm coaxial cable with an F-type connector from the LNB to the IRD connector labelled RF IN.
2. Connect the audio and video outputs as required, using the appropriate connector type. Refer to the table at the beginning of this connection for a description of all rear panel connections. A typical system setup is shown in the following illustration.
3. Connect the AC power cord supplied to the specified power source.

Typical Single LNB System Interconnections


ANTENNA SIGNAL
LNB
ANTENNA SIGNAL
ACTUATOR
Cable Modulator
Provides 2-channel balanced audio for connection to a Cable Modulator for use in headend applications.
Selects the Balanced Audio Output for either Mono or Stereo Audio.
Provides Video Signal for connection to a Cable Modulator.
TV
VCR
Connects to TV or VCR Antenna input.
Provides Mono and Stereo Audio hookup. Allows stereo sound (B-MAC Mode only) with TV.
TV
Selects B-MAC Audio Output to VHF Modulator for BTV applications. CH1 selects B-MAC Audio Channel 1, while CH1 & 2 selects the Sum (monaural) Output of B-MAC Audio Channels 1 & 2.
Connects to On-Air Antenna or Cable TV signal. Automatically routed to TV OUT when receiver is off.
Selects TV Out VHF Frequency.
Smart Card receptacle for upgradeable security.
EXPANSION PORT
UTILITY PORT
ALARM CONTACTS
COMPRESSION MODULE
Subcarrier Demodulator
Composite Baseband Output (with pre-emphasis) for use in cable headend applications.
For future use
REDUNDANCY SWITCH
Connects to a Computer to provide Utility Data, Auxiliary Data Remote Tuning and Diagnostics Controls.
Connects to a Redundancy Switch such as the S-A Decoder Changeover Switch to switch Audio and Video from a standby IRD.
IF loop is only installed when Compression Module is installed.

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Dual LNB System

In a dual polarization system, one LNB is used to receive the vertically polarized signals, and the other is used to receive the horizontally polarized signals. The polarization control outputs are used to select the appropriate LNB for the receiver input. Refer to the figure on the next page when connecting the IRD to a dual LNB system.

CAUTION

DC voltage is always present at the RF IN connector when the AC power is supplied to the IRD. The IRD should not be used to power more than one LNB.

Connect the IRD as follows:

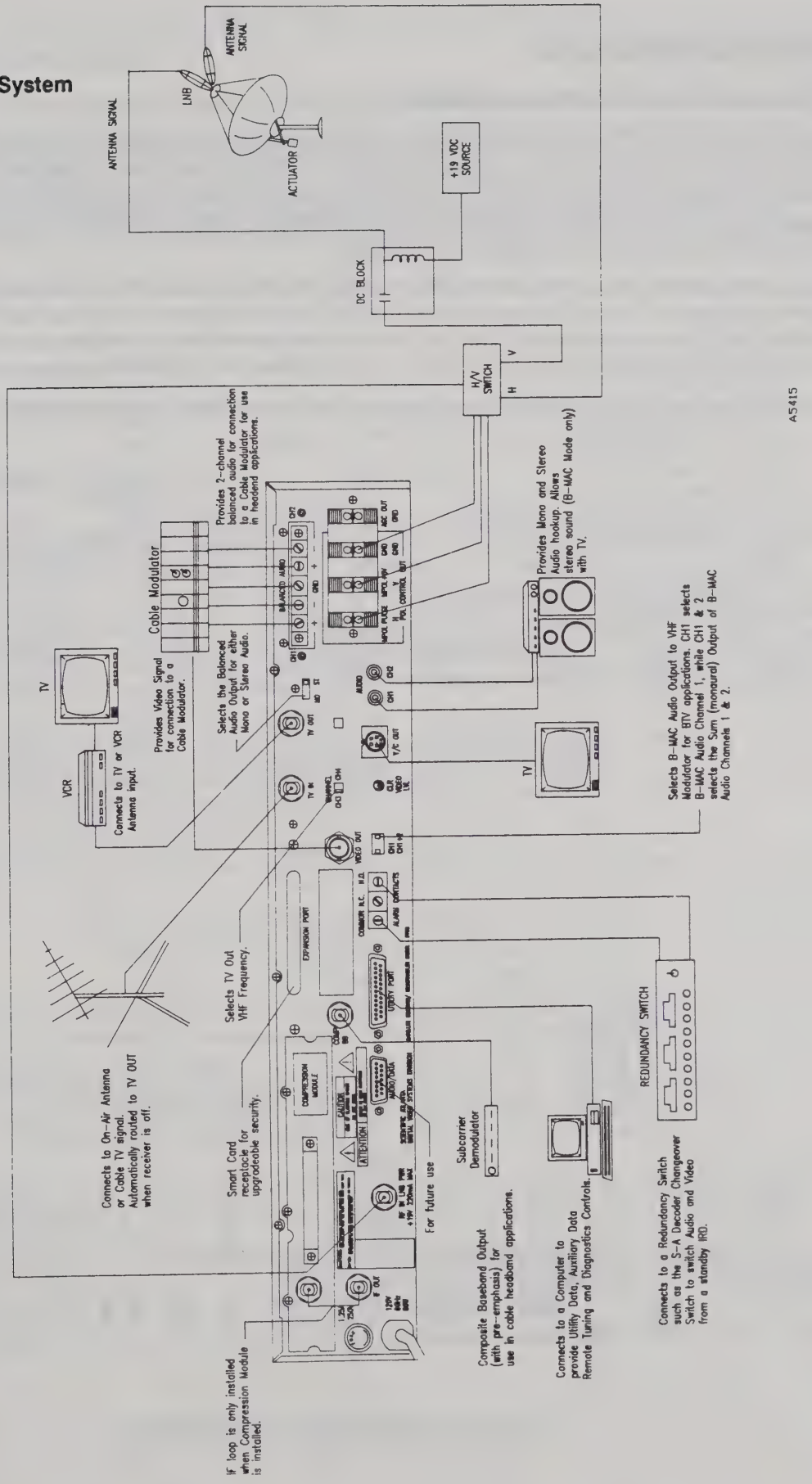
Step

1. Connect a 75-ohm coaxial cable with an F-type connector from an external electrical horizontal/vertical (H/V) switch to the rear panel connector labelled RF IN. Refer to the table at the beginning of this section for a description of all rear panel connections.
2. Connect the audio and video inputs and outputs as required, using the appropriate connector type. A typical system setup is shown in the following illustration.
3. Connect the horizontal LNB to the H input of the H/V switch.
4. Connect the vertical LNB to the DC block as shown in dual LNB system setup illustration. Then connect the DC block to the V input of the H/V switch.
5. An external DC voltage must be provided to power the LNB.
6. Connect the H, V, and GND switch outputs of the IRD to the corresponding H/V switch inputs.
7. Connect the AC power cord supplied to the specified power source.

REMOTE DIAGNOSTICS AND TUNING CONTROL

The IRD can be remotely polled for B-MAC diagnostics information by connecting it to a PC either directly, via telephone line and modems, or VSAT data terminal. A simple user-provided program can then be implemented on the PC to transmit and receive diagnostic or tuning control commands and information respectively. Request the "Model 9708 IRD Remote Serial Interface Communications Protocol Specification" from Scientific-Atlanta for more information.

Typical Dual LNB System Interconnections


ANTENNA SIGNAL
LNB
ANTENNA SIGNAL
ACTUATOR
+13 VDC SOURCE
DC BLOCK
H/V SWITCH
V
H
Cable Modulator
Provides 2-channel balanced audio for connection to a Cable Modulator for use in headend applications.
Selects the Balanced Audio Output for either Mono or Stereo Audio.
Provides Video Signal for connection to a Cable Modulator.
TV
VCR
Connects to TV or VCR Antenna input.
Provides Mono and Stereo Audio hookup. Allows stereo sound (B-MAC Mode only) with TV.
TV
Selects B-MAC Audio Output to VHF Modulator for BTV applications. CH1 selects B-MAC Audio Channel 1, while CH1 & 2 selects the Sum (monaural) Output of B-MAC Audio Channels 1 & 2.
A5415
Connects to On-Air Antenna or Cable TV signal. Automatically routed to TV OUT when receiver is off.
Selects TV Out VHF Frequency.
Smart Card receptacle for upgradeable security.
Subcarrier Demodulator
Composite Baseband Output (with pre-emphasis) for use in cable headband applications.
For future use
Connects to a Computer to provide Utility Data, Auxiliary Data Remote Tuning and Diagnostics Controls.
REDUNDANCY SWITCH
Connects to a Redundancy Switch such as the S-A Decoder Changeover Switch to switch Audio and Video from a standby RD.
IF loop is only installed when Compression Module is installed.

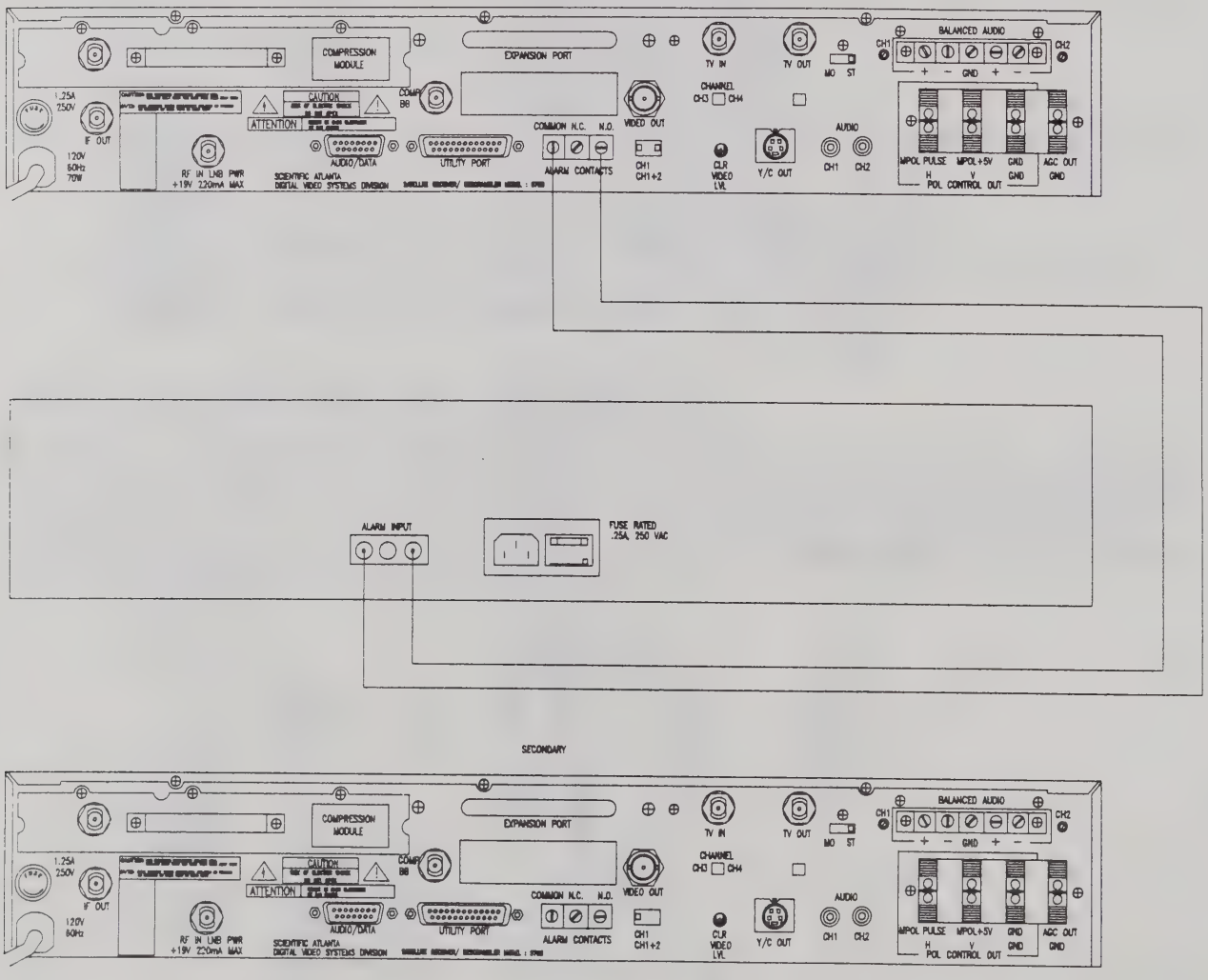
ALARM CONNECTIONS

Primary IRD to Redundancy Switch

The ALARM CONTACTS on the 9708 IRD are designed for connection to an S-A Decoder Changeover Switch (DCS) or compatible unit. An alarm condition in the IRD is generated by removal or loss of the B-MAC input signal. When this occurs, the (normally closed) alarm relay contacts change state, creating an open condition. When the DCS receives a signal indicating a change in state of the relay contacts in the primary IRD, it switches to the redundant IRD output.

Alarm connections between the primary IRD and DCS are shown below. When using a DCS, connect the Normally Open (N.O.) and Common ALARM CONTACTS on the rear panel of the primary IRD to the ALARM INPUT on the rear panel of the S-A Decoder Changeover Switch, with the two-conductor DCS alarm harness supplied, DVS Part No. 774-327. (Connections are made to the primary IRD only.)

For video and audio connections, refer to the redundant system setup on the next page.



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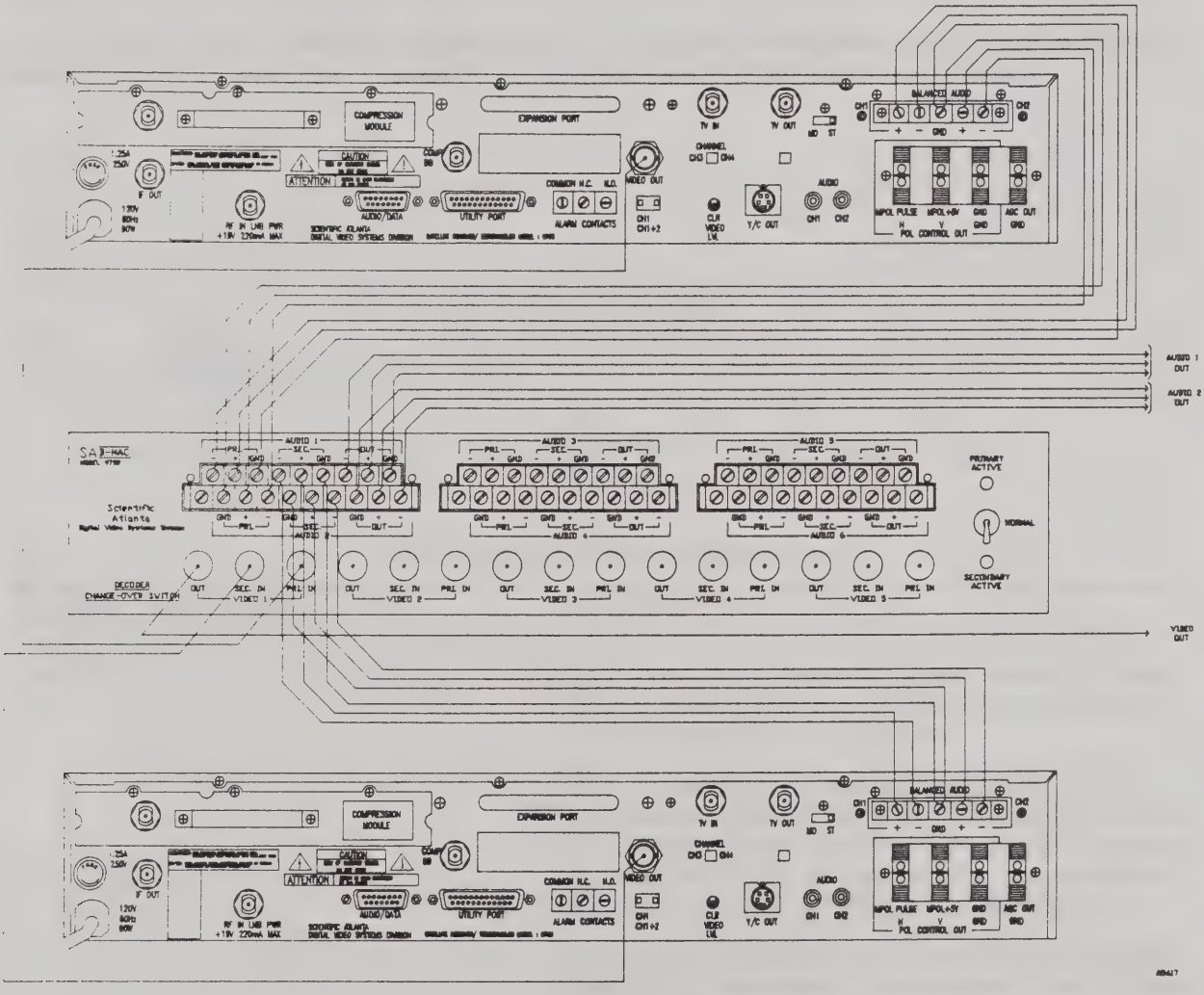
ALARM INTERCONNECTION DIAGRAM

Redundant System Setup

This section outlines the video and two-channel balanced audio interconnections when using an S-A Decoder Changeover Switch to switch both broadcast video and audio in a redundant system. Connect the primary and secondary IRDs to the DCS as shown in the Redundant IRD Setup diagram below. Note that a redundant IRD downlink system is presently only applicable for headend applications. Refer to the operator's manual supplied with the Decoder Changeover Switch for more specific information on the input and output port connections. However, only this manual is applicable to the 9708 IRD redundant system setup.

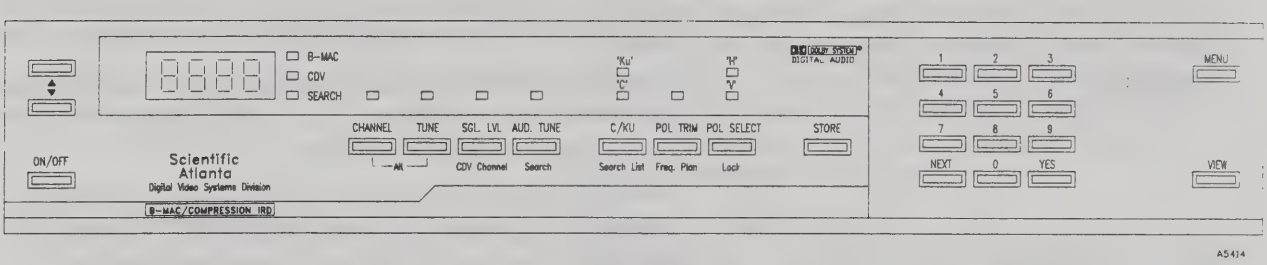


REDUNDANT IRD INTERCONNECTIONS

FRONT PANEL CONTROLS AND INDICATORS

The IRD, shown below, is simple to operate using the front panel pushbutton switches. The front panel is divided into two sections, the mode function pushbutton switches and their associated display LEDs, and the main keypad on the right. Operating instructions for the front panel switches are given in the table below.

When the Lock mode is enabled, particular switches or buttons have no affect on unit operation. Refer to **Lock Modes** for a description of the locked-out buttons in each of the three modes available.



Front Panel

Front Panel Controls and Indicators

CONTROL/INDICATOR	FUNCTION
ON/OFF	Press this button to alternately select between ON and OFF. It does not control LNB power or power used in the receiver/authorization circuitry. When the optional TV modulator is installed, the composite video signal is input to the TV modulator when in the ON state. When in the OFF state, the TV IN signal is bypassed to TV OUT. Baseband video and audio are muted, and the front panel LEDS are switched off. If AC power is interrupted, the IRD automatically returns to the ON/OFF state prior to interruption. If the IRD was ON prior to power interrruption, it will display the last channel selected when power returns. If the message "FAIL" appears in the display when powering up the unit, contact your nearest S-A service center for assistance.
B-MAC	This indicator is lit when IRD is receiving a valid B-MAC signal. It flashes when receiving, but not authorized for, a B-MAC signal.

Front Panel Controls and Indicators (continued)

CONTROL/INDICATOR	FUNCTION
CDV	This indicator will be on when the IRD is receiving an authorized CDV signal, or will flash when receiving an unauthorized CDV signal.
SEARCH	This indicator will flash when Search mode is selected, and will be on when the IRD has found an authorized signal.
Δ	Press the Δ button to increment a mode parameter. The display is continually incremented while this switch is pressed. If the highest parameter limit is displayed, pressing this switch increments the display to the lowest limit.
∇	Press the ∇ button to decrement a mode parameter. The display is continually decremented while this switch is pressed. If the lowest parameter limit is displayed, pressing this switch decrements the display to the highest limit.
CHANNEL	Press CHANNEL to select Channel mode. The indicator above the button will light. The current channel number is displayed while in this mode. Press CHANNEL and then Δ or ∇ to select channels 1 through 99 (depending on the frequency plan selected). The IRD is set to Channel mode when switched on. Channel numbers can also be entered on the main keypad.
TUNE	Press TUNE to enter Tune mode. The indicator above the button will light. In this mode, the current L Band channel receive frequency is displayed in MHz units. Δ and ∇ may be used to select a frequency from 950 MHz to 1450 MHz in 100 kHz steps. Direct channel entry via the keypad is disabled in this mode. Fine Tuning Press TUNE and then Δ or ∇ to select the desired frequency. Rapid Tuning Press and hold TUNE while you press Δ or ∇ for rapid IF selection. Then fine tune to the specific frequency.
SIG LVL	Press SIG LVL to enter the Signal Level Display mode. The indicator above the button will light. A number from 0 to 99 is displayed which corresponds to a relative RF IN signal level. Direct channel entry via the keypad is disabled in this mode.
AUD TUNE	Press AUD TUNE to enter the Audio Subcarrier Tune mode. The indicator above the button will light. The current audio subcarrier frequency is displayed in MHz units. Δ or ∇ may be used to select a frequency from 5.00 MHz to 8.50 MHz in 20 kHz steps. Direct channel entry via the keypad is disabled in this mode.

Front Panel Controls and Indicators (continued)

CONTROL/INDICATOR	FUNCTION
AUD TUNE (cont'd)	Fine Tuning Press AUD TUNE and then Δ or ∇ to select the desired frequency. Rapid Tuning Press and hold AUD TUNE while you press Δ or ∇ for rapid selection of frequency in 20 kHz steps. Then fine tune to the specific frequency.
C/KU	Press C/KU to alternately select between C-band (inverted video) or Ku-Band (noninverted video) for each channel. The indicator above the button shows the polarity selected.
POL SEL	Press POL SEL to alternately select between horizontal and vertical polarization, programmable on a per channel basis. The corresponding indicator above this button will light.MPOL +5V and MPOL PULSE outputs are activated only if the current trim setting differs from the selected polarization. Direct channel entry via the keypad is disabled in this mode. Mechanical Polarizer Press POL SEL to select the RF Tuning polarization to be trimmed. Then press POL TRIM. Use Δ and ∇ to obtain best signal reception.
POL TRIM	Press POL TRIM to select the Polarization Trim mode. The indicator above the button will light. This mode is used to display and adjust the pulse width to a mechanical polarizer. The current trim setting is displayed in relative units. Use Δ and ∇ to adjust the trim setting in the range from -50 through 50 one number at a time, to obtain the best picture. Each steps represents a 20 uS change in pulse width. Fine Trimming Press POL TRIM and then Δ or ∇ to trim the desired setting in steps of ±1. Rapid Trimming Press and hold POL TRIM while you press Δ or ∇ for rapid trim selection in steps of ±1. Then fine tune to the specific setting. Direct channel entry via the keypad is disabled in this mode.
STORE	**Press STORE to save the setting for the current channel.** The following parameters for the current channel are written (stored) to non-volatile memory: • L Band tuning frequency • Audio subcarrier frequency • CDV channel • Lock level • RF polarization

Front Panel Controls and Indicators (continued)

CONTROL/INDICATOR	FUNCTION
STORE (cont'd)	• Video polarity • Search List state • Frequency Plan **Any changes made to the current channel are lost if a different channel is selected or a power interruption occurs, unless a STORE operation is performed.** Unselected channels are not affected. **The display will flash three times and the IRD will reset to the Channel mode to indicate a successful Store operation. If this does not occur, contact the nearest S-A service center.** See **LOCK MODES** for the functions and parameters that can be changed in each mode.
Alternate Mode Function Keys	
Alt	Press CHANNEL and TUNE simultaneously to select the Alternate (Alt) mode. The display will read "Alt" when this mode is selected. A number of functions can only be performed in Alt mode, such as changing the CDV channel display, enabling Auto Search, changing the Frequency Plan, and changing the Lock level. See **Alternate Mode** for a full description of these functions.
CDV Channel	Press CDV Channel to display and change both the main channel and the associated CDV subchannel. The IRD immediately returns to the Channel mode. A CDV subchannel is a digital channel in the TDM mulitplex. To change the CDV subchannel, press the Δ or ∇ button to either increase or decrease the channel number in the range from 0 to 9. To change the main channel number, press and hold CHANNEL while you press Δ or ∇. See **To Change the CDV Channel**. The CDV and B-MAC LEDs will be on (steady) when the IRD is receiving an authorized CDV signal, or will flash when receiving an unauthorized CDV signal.
Search	Press Search to select the Auto Search mode. When this switch is pressed, the IRD will begin to search through all the B-MAC and CDV channels in the search list. When a B-MAC or CDV signal is found that the IRD is authorized to receive, the IRD will lock onto it. The Search LED will flash while searching in this mode. When the IRD finds an authorized signal, the LED will be on (steady). If the IRD loses authorization for the displayed channel, it will begin to search again. The Search function is useful in networks where the transponder allocated to B-MAC is changed periodically. See **Auto Search**.

Front Panel Controls and Indicators (continued)

CONTROL/INDICATOR	FUNCTION
Search List	A decimal point will appear with the channel number after the channel has been stored indicating that the channel number has been added to the Search List. This also forces the IRD to stop on the marked authorized channel while in the Auto Search mode. If you mark a channel (with a decimal point) that the IRD is not authorized to receive, the IRD will not lock onto the channel. Instead it will proceed to the next channel in the Search List that it is authorized to receive, and lock onto it. See **Adding Channels to the Search List**.
Freq. Plan	Press Freq. Plan to display the currently selected frequency plan. The default (factory selected) plan is GS. Press the Δ and ∇ buttons to display the different plans available (e.g., C, SBS, USEr, etc). A decimal point appears in the right corner of the display indicating the stored plan Two plans are always available; USEr and a default plan selected by the operator. The USEr plan is a preselected plan that cannot be overwritten by any other plan, and can be customized to your suit your requirements. To change (redefine) the transponder settings for any channel in a selected frequency plan, see **Frequency Plan Mode** and **Redefining Channel Settings**.
Lock	Press Lock to display the currently selected Lock level. Press the Δ and ∇ buttons to change the display to the level you want. Note the restrictions that apply to the setting you have selected. See **To Change the Lock Level**.
Numeric Keypad	
0 - 9	These buttons can be used to directly enter a channel number when in the Channel mode (instead of using the Δ and ∇ keys), select a menu in the Menu mode, or enter a new PIN code. See **CONTROL MENU FUNCTIONS** for more information.
MENU	Pressing **MENU** lets you use the control menu which allows selection of a number of services. When this button is pressed, the B-MAC control menu is displayed on your TV set or monitor. See **CONTROL MENU FUNCTIONS** for more information.
NEXT	Pressing **NEXT** allows you to advance to the next page of text channels or changes settings when in the control menu mode. It also moves the menu pointer to the next item in the menu.
YES	Pressing **YES** confirms a menu item selection.
VIEW	Pressing **VIEW** while watching a video channel will display information about the channel currently being watched. Pressing this button while in any other mode will return you to Channel mode.

Front Panel Controls and Indicators (continued)

CONTROL/INDICATOR	FUNCTION
VIEW (cont'd)	When using the control menu, pressing **VIEW** returns you to the channel you were watching. This button can also be used for channel selection.

The status of the B-MAC and CDV LEDs are dependent upon the whether the IRD is authorized to receive the signal being received. The following table identifies the different states that these LEDs can exhibit.

LED STATUS B-MAC	LED STATUS CDV	SIGNAL/MODE STATUS
OFF	OFF	No B-MAC signal, operating in NTSC bypass mode.
Flashing	OFF	Unauthorized B-MAC signal present.
ON	OFF	Authorized B-MAC signal present.
OFF	Flashing	Unauthorized CDV signal present.
OFF	Flashing	Invalid CDV signal or subchannel, operating in NTSC bypass mode.
ON	ON	Authorized CDV signal present.

INITIAL SETUP AND POWER ON PROCEDURE

The IRD is set to automatically turn on when the AC power cord is plugged into an electrical outlet. The indicator above the **CHANNEL** button should light and the display should indicate the current channel number. If the indicator or the display are not lit, press **ON/OFF** and observe if the unit is now operational. If it is not, contact the nearest S-A service center.

MONITORING THE SIGNAL LEVEL

The relative level of the received signal at the RF IN connector may be displayed by selecting **SIG LVL**. The number displayed can vary from a minimum signal strength of 0 to a maximum of 99. Typically, the number displayed should be between 50 and 80 for an input signal level of -50 dBm. This mode may be used for antenna peaking.

The AGC output terminal provides a 0 to 5V DC signal which is proportional to the input signal level. This output may be used to drive a remote voltmeter for antenna adjustment.

MODES OF OPERATION

The Model 9708 IRD is designed to operate in a number of different modes applicable to different functions. For example, to change channels, you must be in Channel mode, to tune a channel to a different frequency, you must be in Tune mode, etc. The different modes of operation are listed below.

Channel Mode

Channel mode is selected when the unit is powered on. The indicator above the button will be on when this mode is selected. The various ways to select channels are:

1. Pressing the channel up Δ or down ∇ buttons will change the channels one at a time in the direction pressed.
2. Press the individual numerical button and then the **VIEW** button.

   Example: For channel 7, press 7 then VIEW.

Pressing the **VIEW** button after pressing one numerical button will instantly change the channel.

3. Press the individual numerical buttons using a 2-digit sequence. This will change the channel instantly.

   Example: For channel 7, press 0 7.

   Note: If only one numbered button is pressed to select a channel, the IRD will automatically switch to that channel after a five-second delay. If you enter a channel number which is outside the range of the frequency plan, the receiver will not change channels.

Tune Mode

Tune mode is selected when you press the **TUNE** button. The indicator above the button will be on when this mode is selected.

Pressing the **TUNE** button displays the current L-band frequency (in MHz) for the selected transponder channel according to your preprogrammed frequency plan. See Appendix A for the available frequency plans.

Use the Δ and ∇ buttons to select a frequency in the range from 950 MHz to 1450 MHz in 100 kHz steps. You can rapidly tune to the frequency you want by pressing and holding the **TUNE** button while pressing the Δ or ∇ button. When you have displayed the desired L-band frequency, press **STORE** to save the new setting. The display will flash three times and return to Channel mode.

Signal Level Mode

Signal Level mode is selected when you press the **SGL. LVL** button. The indicator above the button will be on when this mode is selected. A number is displayed which indicates a relative measure of the RF signal strength in the range from 0 to 99. 0 indicates no signal.

Polarization Trim Mode

The Polarization Trim mode is selected when you press the **POL TRIM** button. This mode is used to display and adjust the position of the signal sent to the mechanical polarizer. The Pol Trim setting is displayed in relative units from -50 to 50, each unit representing a 20 uS change is pulse width. To fine trim, press **POL TRIM** and then Δ or ∇ to select the desired setting ±1 step at a time. For rapid trimming, press and hold **POL TRIM** while you press the Δ or ∇ button. Then fine tune to the desired setting.

The IRD retains the horizontal and vertical trim settings automatically. MPOL PULSE and MPOL +5V are activated when the Δ or ∇ button is pressed. When you have displayed the desired setting, press **STORE** to save the new trim setting. The display will flash three times and return to the Channel mode. The MPOL +5V and MPOL PULSE outputs on the rear panel are only activated when the trim setting is changed to a value that is different than the last setting stored. The same values are retained for all channels.

The H and V LEDs above the POL SELECT button indicate the polarity of the signal being trimmed. Use the **POL SELECT** button to alternately select between horizontal and vertical polarization. Press **STORE** to save the new setting and return to the Channel mode.

Audio Tune Mode

Audio Tune mode is selected when you press the **AUD. TUNE** button. The audio subcarrier frequency for the selected transponder channel is displayed in MHz. This frequency may be changed from 5.0 MHz to 8.5 MHz in 20 kHz steps. You can rapidly tune to the frequency you want by pressing and holding the

This function is only useful on units equipped with the bypass option. Check the **Group Mode Configuration Menu** to see if the bypass option is installed; indicated by "Bypass Installed" on the screen.

Note: Due to the extended video bandwidth of 625-line PAL-B systems, it is recommended that only audio subcarriers above 6.0 MHz be used.

Alternate Mode

A number of functions can only be performed in Alternate (Alt) mode, such as selecting the CDV channel display, Auto Search, changing the frequency plan, and changing the lock level. Alt mode is selected by pressing and holding the **CHANNEL** and **TUNE** switches simultaneously. The display will read "Alt" and the LEDs above both the CHANNEL and TUNE buttons will flash.

The functions that can be performed in Alt mode are described below.

CDV CHANNEL MODE (Alt + CDV Channel)

The CDV Channel mode is only intended for use when the Compression module is installed, in which case the IRD is able to receive compressed (digital) video signals. However, this mode may be used to pre-program the subchannels you want to receive prior to installing the compression module. When the IRD is receiving a an authorized CDV subchannel, the CDV LED will flash, and will be on when receiving an authorized CDV signal.

The CDV Channel button allows you to display and change the CDV channel (subchannel) associated with the main channel currently selected. To change the CDV subchannel see the instructions below.

Changing the CDV Channel

The **CDV Channel** button allows you to display and change the CDV channel (subchannel) associated with the main channel currently selected, when receivng TDM transmissions only.

The subchannel associated with any of the 99 main channels is displayed as Main Channel-Subchannel, e.g., 44-5.

To choose another CDV subchannel associated with the selected main channel, proceed as follows:

1. Press the **CHANNEL** and **TUNE** buttons simultaneously to enter "Alt" mode. The LEDs above both buttons will flash, and continue to flash until the display has been returned to Channel mode.
2. Press the **CDV Channel** button to enter CDV mode. This displays the CDV subchannel associated with the main channel currently selected. The IRD immediately returns to the Channel mode.
3. Press the Δ or ∇ button to either increase or decrease the subchannel number until you find the channel that you want in the range from 0 to 9. You can also change the main channel number using the keypad by holding the CHANNEL button and then pressing the Δ or ∇ button to increase or decrease the displayed number. However, this will cause any changes made to the subchannel and any other parameters associated with the displayed main channel to be lost unless you press STORE.
4. Press **STORE** to save the new CDV channel and return to Channel mode. If you do not want to change the CDV channel and instead, retain the original channel, change the main channel number by holding the CHANNEL button and then pressing the Δ or ∇ button.

The Auto Search and Search List functions can also be used when the CDV channel is displayed. Main channels are scanned along with their associated subchannels. See **AUTO SEARCH MODE** for more information.

AUTO SEARCH MODE (Alt + Search)

While in 'Alt' mode, press the **Search** button to select the Auto Search mode. The Search LED will flash while in this mode and return control to the Channel mode. When this button is pressed, the IRD will begin to search through all the B-MAC and CDV channels in the search list. When a B-MAC or CDV signal is found that the IRD is authorized to receive, the IRD locks onto the authorized signal. The B-MAC and/or CDV LED will stop flashing when the IRD has locked onto the authorized signal and remain on (steady). This is useful in networks where the transponder allocated to B-MAC is changed periodically.

When the **Search** button is pressed, a search is initiated starting with the next channel in the Search List after the current channel. Each channel in the Search List that the IRD is authorized to receive is indicated in the display by a decimal point (all channels should be marked). These are the only channels that the IRD will recognize. The IRD will search each channel in the search list for B-MAC for up to 10 seconds and if a B-MAC signal is found, will attempt to achieve authorization for up to two (2) minutes. If authorization is not achieved after two minutes, the IRD will move to the next channel in the Search List. If no authorization is achieved for any channel in the Search List, the display will continuously cycle through the list indefinitely.

Upon initial installation, the search list is empty. See the instructions below to create a Search List, and add all the B-MAC or CDV channels to the search list that the IRD is authorized to receive (see Adding Channels to or Deleting Channels from the Search List).

To exit Auto Search, select "Alt" mode again (press CHANNEL and TUNE simultaneously) and then press the Search button. This sequence is identical to the order in which you previously entered Auto Search mode.

NOTE

It is not advisable to use Search Mode in systems with a motorized polar rotor. Mechanical polarizers are not typically designed for continuous switching. Please check with your LNB dealer to determine whether your polar rotor may be used for this function.

Adding Channels to or Deleting Channels from the Search List

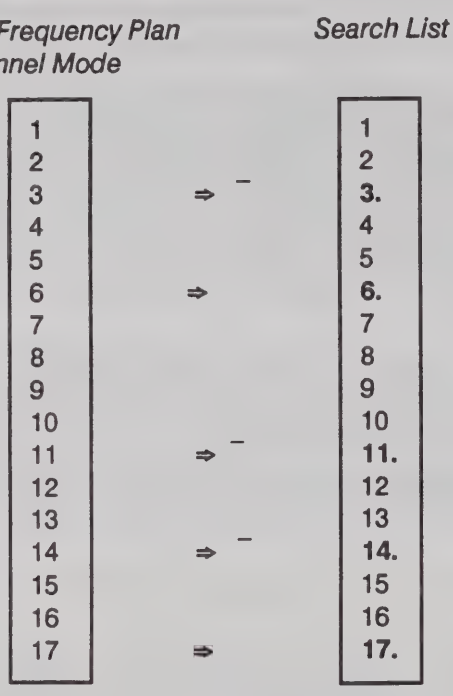
Adding Channels to the Search List

To add a channel to the Search List, it is recommended that you be in Channel mode. Follow the steps below to perform this function.

1. Press **CHANNEL** to enter the channel mode.
2. Press the Δ or ∇ button to display the first transponder channel in the preprogrammed frequency plan that you want to add to the Search List.
3. Press **CHANNEL** and **TUNE** simultaneously to enter "Alt" mode. The display will read "**Alt**".
4. Press **Search List** and then **STORE** to add the channel to the Search List. A decimal point will appear in the bottom right corner of the display indicating that the channel number has been added to the Search List. This also forces the IRD to lock onto the marked authorized channel while in the Auto Search mode. If you mark a channel that the IRD is not authorized to receive, the IRD will not lock onto the channel. Instead, it will proceed to the next channel in the Search List that it is authorized to receive, and lock onto it.
5. To add a second channel to the Search List, repeat steps 2 to 4 for the second transponder channel. Repeat steps 2 through 4 until you've added all the channels to the Search List that the IRD is authorized to receive.

Example

When adding five channels (3, 6, 11, 14, and 17) to the Search List in an IRD using the preprogrammed C Band frequency plan, the Search List would appear as shown below. Note that the channels that the IRD is authorized to receive are marked with a decimal point (".").



Deleting Channels From the Search List

To delete a channel from the Search List, you must be in Channel mode. Follow the steps below to delete a channel from the Search List.

1. Press **CHANNEL** to enter the channel mode.
2. Press the Δ or ∇ button to display the first transponder channel in the selected frequency plan that you want to delete from the Search List.
3. Press **CHANNEL** and **TUNE** simultaneously to enter "Alt" mode. The LED display will read "**Alt**".
4. Press **Search List** and then **STORE** to delete the channel from the Search List. The IRD will then search through the channels left on the Search List when Auto Search is activated.
5. To delete a second channel from the Search List, repeat steps 2 to 4 for the second transponder channel. Repeat steps 2 through 4 for each channel that you want to delete from the Search List.

FREQUENCY PLAN MODE (Alt + Freq. Plan)

The Freq. Plan mode allows you to choose any of the available frequency plans stored in ROM. To select a different frequency plan, you must be in Alternate mode.

Selecting a Different Frequency Plan

To select a different frequency plan, perform the following steps while in Alternate mode.

1. Press **CHANNEL** and **TUNE** simultaneously to enter "Alt" mode. The LED display will read "**Alt**". The LEDs above the CHANNEL and TUNE buttons will flash while in this mode.
2. Press the **Freq. Plan** button. Uppercase letters identifying the currently selected frequency plan will be displayed, e.g., C, SBS, USEr, etc. The LED above the Freq. Plan button will flash while Freq. Plan mode is selected.
3. Press the Δ and ∇ buttons to display the different plans available. When you find the the plan that you want, press **STORE** to save the new plan and return to Channel mode. To change (redefine) the transponder settings for any channel, see **Redefining Channel Settings**.

   Press **VIEW** to exit the Freq. Plan mode and return to Channel mode without saving any changes.

Creating a Customized Frequency Plan

You can create your own customized frequency plan by selecting the plan labelled "USEr". This plan consists of 99 transponder channels factory set to the same parameters. To select the USEr plan, enter the Frequency Plan mode and use the Δ or ∇ button to display "USEr" as shown below. Note that a decimal point appears in the right corner of the display indicating that this plan is stored in memory; it cannot be overwritten by any other plan.

indicates a stored frequency plan

It is recommended that you use the USEr frequency plan whenever possible; unless you do not intend to change the frequency in the future. For example, if your select the GS frequency plan, and change to the ASC plan in future, the GS plan will be overwritten with the ASC frequency plan.

To customize each channel in the USEr plan to your own parameters, refer to **Redefining Channel Settings**.

LOCK MODES

Under normal operating conditions, all the front panel buttons are functional. However, three different levels of front panel lock-out are available on the 9708. These are useful to prevent anyone from accidentally changing parameters. See the table below and the description for each lock level available.

ENABLED PARAMETERS	LOCK LEVELS		
	Loc0	Loc1	Loc2
On/Off	●	●	ON only
Channel	●	●	
Tune	●		
Aud. Tune	●	●	
C/Ku	●		
Pol Trim	●		
Pol Select	●		
CDV Channel	●	●	
Auto Search	●	●	
Search List	●	●	
Freq. Plan	●		
Menu	●	●	
Keypad	●	●	
Lock	●	●	●

Level 0

This is the default level (Loc0). Loc0 allows all front panel functions to be available. All operating parameters can be both displayed and changed.

Level 1

In level 1 (i.e. Loc1), the following parameters can be displayed but not changed.

Tune
C/Ku
Pol Trim
Pol Select
Frequency Plan

Level 2

In level 2 (i.e. Loc2), the most restrictive of all levels, all the front panel buttons and their associated parameters are locked out, except LOCK. At this level, parameters can only be displayed. These include:

On/Off - On only
Channel
Tune
Sgl Lvl
Aud. Tune
Pol Trim
Menu - not available
Numeric Keypad - not functional
Frequency Plan
CDV Channel

To Change the Lock Level

To change the lock level (from one level to another), you must be in the 'Alt' mode. Place the IRD in the 'Alt' mode and change the lock level as follows:

1. Press **CHANNEL** and **TUNE** simultaneously to enter "Alt" mode. The front panel LED display will read "**Alt**".
2. Press the **LOCK** button to display the lock level (default setting is Loc0). The LED display will read the last setting stored (Loc0, Loc1, or Loc2). The LED above the button will flash.
3. Press the Δ and ∇ buttons to change the display to the level that you want. When the setting that you want is displayed, press **STORE** to save the setting and return to Channel mode. Note the restrictions previously listed that apply to the setting you've selected.

   To exit the Lock mode and return to Channel mode without saving any changes, press **VIEW.**

PROGRAMMING

Redefining Channel Settings

The IRD is shipped with up to 32 preprogrammed transponder channels. The factory settings for each channel are dependent upon the frequency plan selected. The available frequency plans are shown in Appendix A. To redefine a channel, the following steps should be followed:.

1. Press **CHANNEL** to enter Channel mode.
2. Press the Δ and ∇ buttons to select the new channel.
3. Press **TUNE** and the Δ or ∇ button to select the new IF frequency for the channel.
4. Select the video polarity using the **C/KU** button.
5. Select the RF polarization using **POL SEL** (if using a mechanical polarizer, press **POL TRIM** and use the Δ and ∇ buttons until the best signal reception is obtained).
6. Press **AUD TUNE** and use the Δ and ∇ buttons to select the audio subcarrier frequency (in NTSC mode) for the new channel.
7. Press **STORE** to save the new channel (setting) parameters.

Factory Channel Reinitialization

The default factory channel settings may be restored as follows:

1. Press **STORE**.
2. While the display is flashing (for one second), press the Δ and ∇ buttons simultaneously.
3. When "**ALL**" appears in the display (for approximately 2 seconds), press **STORE**. The "ALL" display will flash five times. The IRD will then return to the last channel selected, and reset to the Channel mode.

The factory preprogrammed frequency plans can be restored by changing to another plan and then back again. This method of retrieving the default plans is recommended, as performing a complete ("ALL") factory channel reinitialization will delete the USEr plan.

This completes the reinitialization procedure. Any violation of this procedure will abort the reinitialization and the IRD will return to the Channel mode. If the IRD does not perform as described above, a malfunction exists. In this case, contact the nearest S-A service center immediately.

CONTROL MENU FUNCTIONS

The IRD displays a control menu screen on your TV or monitor that that allows you to control a variety of functions.

To access the control menu, press **MENU**. Then to select any one of functions on the menu, press the number to the left of the function.

> *Example: To Display Group Codes, press 1. The Group Codes submenu will then be displayed.*

You can exit the control menu and return to the channel you were previously viewing at any time by pressing **VIEW**. All front panel buttons except CHANNEL function while in the menu mode.

Group Configuration Menu

This is the main menu. It displays diagnostics and status messages that are used by service personnel when phone-help is necessary to correct a decoder fault. In addition, this menu allows you access to four submenus to display group code information, view decoder status, display text pages, or select captions.

An example of a typical Group Mode Configuration menu appears below.

```
                    Group Configuration

DCP08 v1.00         Unit ID:    000-772-3582
TUN08 v1.00         OSE Ref:    123-456-7890
ISE v3.00a          BER          000
OSE08 v3.00a        ADP status  005/005

CDV module          Bypass Installed

        Submenus

        Press       To
        1           Display Group Codes
        2           View Decoder Status
        3           View Text Pages
        4           Select Captions
        YES         Clear ADP Statistics
        VIEW        Leave Menu
```

Each of the fields displayed on this screen are described below.

Unit ID

This field displays the 10-digit serial number identifying the IRD. The last digit is a check digit (software parameter) which is used in some systems to provide enhanced security.

OSE Ref

This field displays the Smart card ID. The OSE version number and OSE Ref only appear when the smart card is installed, otherwise this field is blank. The last digit is a check digit (software parameter) which is used in some systems to provide enhanced security.

BER

This field indicates the bit error rate (BER) of the received signal, 000 being the ideal rate. The BER provides an indication of the signal quality.

ADP status

This field indicates the number of properly encrypted (good) ADPs received by the IRD compared to the total number of ADPs actually received. This display can be reset to 000/000 by pressing the **YES** button.

CDV module

The message "CDV module" indicates the compression module is installed.

Bypass Installed

The message "Bypass Installed" indicates the NTSC or PAL bypass option is installed. When this message is displayed, the decoder will switch to bypass mode in the event of a loss in the B-MAC signal. If the option is not installed, B-MAC video or text will always be displayed.

CONFIGURATION SUBMENUS

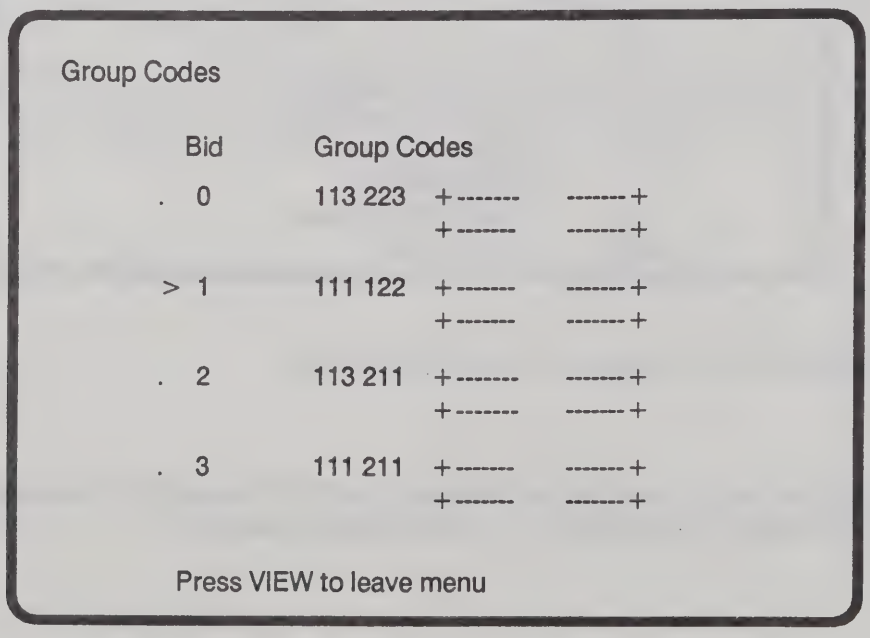
This menu system is common to all modes of operation. To select one of the three submenus from the Configuration menu, press the number to the left of the menu description.

Example: To display the Group Codes submenu, press 1.

Display Group Codes: Press 1

This submenu displays the group codes defined for use for the four different broadcaster IDs. The pointer (>) to the left of the BID column indicates the Broadcaster ID presently in use.

A typical Group Codes submenu is shown below, with Broadcaster !D in use.

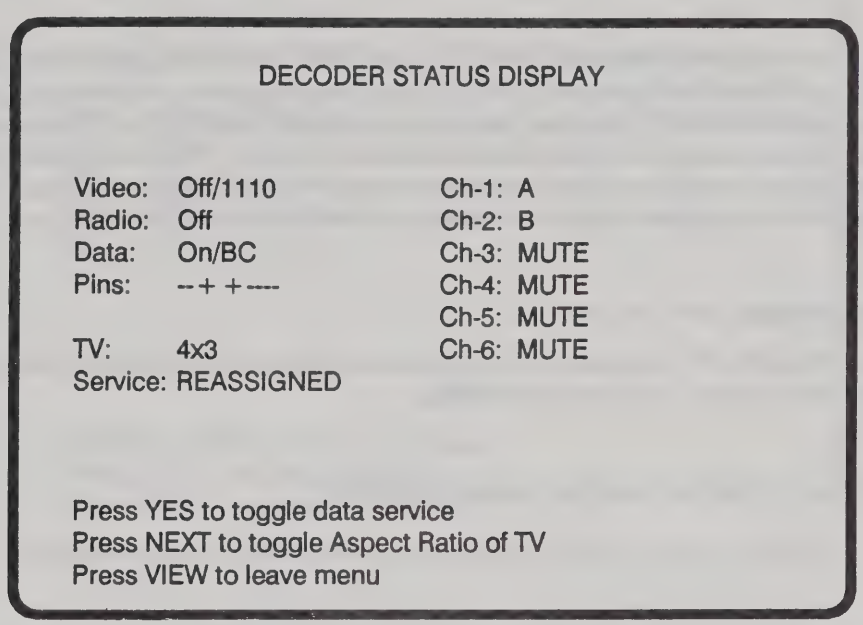


"+" indicates the bit is turned on (enabled), "-" indicates the bit is turned off (disabled). Refer to the B-MAC Baseband Uplink System Software Manual for information on group control of decoders.

Decoder Status Display: Press 2

The Decoder Status submenu displays the decoder setup. The information on this screen is set by the B-MAC Encoder. The Decoder Status Display screen is shown below.

To select this submenu, press **2** when the Group Configuration menu is displayed.



Each of the fields displayed on this screen are described below.

Video

This field displays whether normal video is **On**, **Off**, or in **BYPASS** mode. Also, this field displays the number of the teletext page either being displayed, or that the source is attempting to display.

Radio

This field is set to **Off** as it is not used in BTV applications.

Data

This field displays whether the data service is **On** or **Off** and which data service is currently selected; either **Utility**, **BC** or **EF**.

Control Port Pins

This field displays the external control port pin settings transmitted by the B-MAC Encoder. A "+" indicates the pin is high, "-" indicates the pin is low. This port can be used for a number of different applications, such as switching a VCR on and off.

TV

This field is used to set the aspect ratio of the TV connected to the IRD. When receivng normal B-MAC transmissions, this field is ignored, regardless of its contents. A **16 x 9** aspect ratio is used in this case.

For WideMAC or HDTV applications, this field should be set to **4 x 3** when a normal TV is used as the display device. To activate this field, press the **NEXT** button to toggle this field to display a **4 x 3** aspect ratio.

Note: Using a TV with a 16 x 9 aspect ratio to display a 4 x 3 transmission will result in the picture being distorted (stretched).

Service

This field displays the currently selected service. Use the **YES** button to toggle between **REASSIGNED** and **UTILITY** data. When this field is set to **UTILITY**, the **Data** field above will also display **Utility**. When this field displays **REASSIGNED**, the **Data** field above will display either **BC** or **EF** depending on the CSACS service package being transmitted from the B-MAC Encoder. The default condition is **OFF/BC** when no control is sent during the CSAC transmission cycle. Only outputs C and F are currently available. Outputs B and E will be available in future with the use of the audio expansion feature.

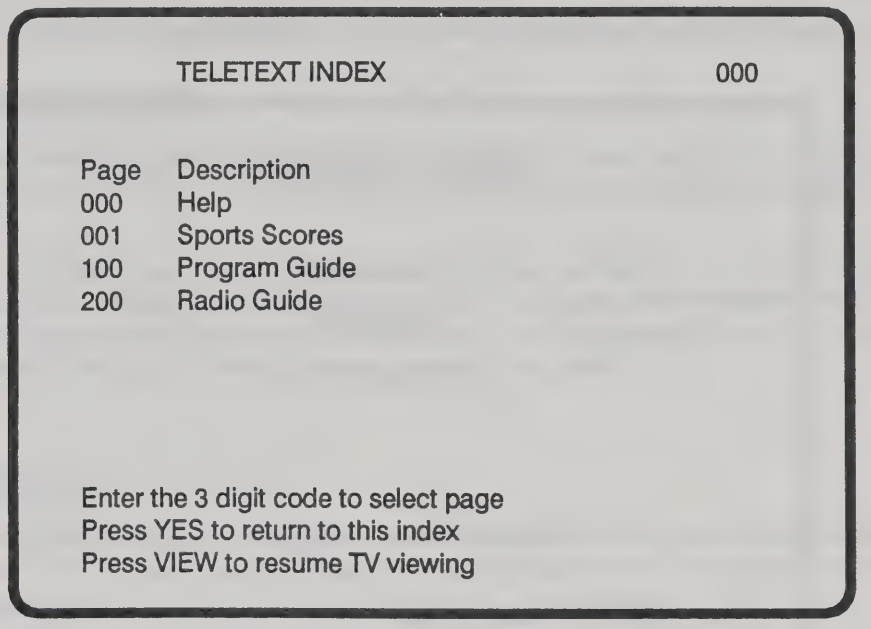
Audio Channel Display, Ch-1 to Ch-6

Each of the six-channels (Ch-1 through Ch-6) in the audio display indicate whether they are routed to one of the outputs, either **A**, **B**, **C**, **D**, **E**, or **F**, or **MUTE**d.

Press **VIEW** to return to normal program viewing at any time.

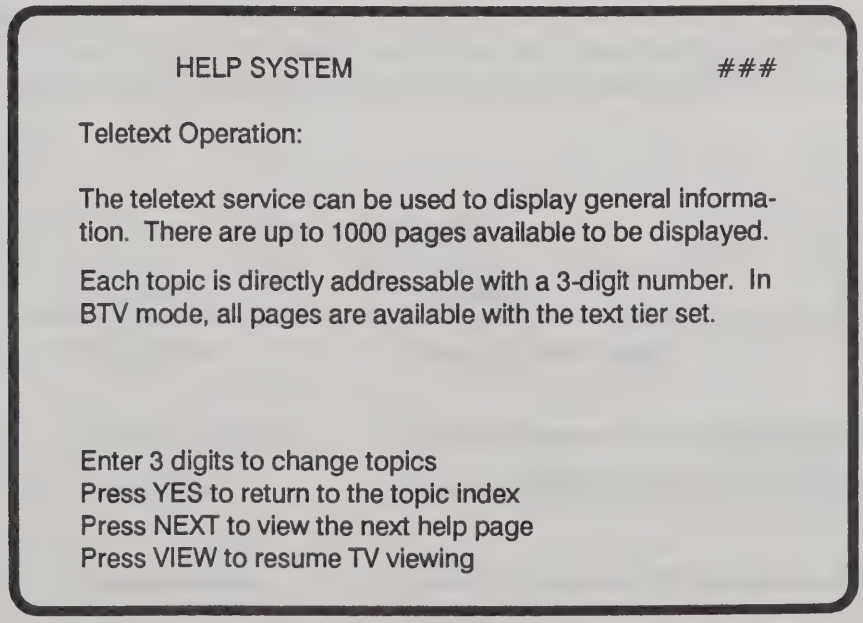
Teletext Index: Press 3

The Teletext Index submenu provides a list of the text service pages available to be displayed. To select this menu, press **3** when the Group Configuration menu is displayed. An example of a typical Teletext Index menu is shown below.


TELETEXT INDEX 000
Page Description
000 Help
001 Sports Scores
100 Program Guide
200 Radio Guide
Enter the 3 digit code to select page
Press YES to return to this index
Press VIEW to resume TV viewing

To select a teletext page, enter the three-digit page number displayed on the Teletext Index menu. The selected teletext page number is displayed at the top of the screen as you enter it. The teletext page is immediately grabbed from the transmitted cycle and displayed.

Example: To select the Help screen, enter 000. A Help screen similar to that shown below will then be displayed. Press the NEXT button to display the next linked page if one is available. If another page is not available, this function is ignored.

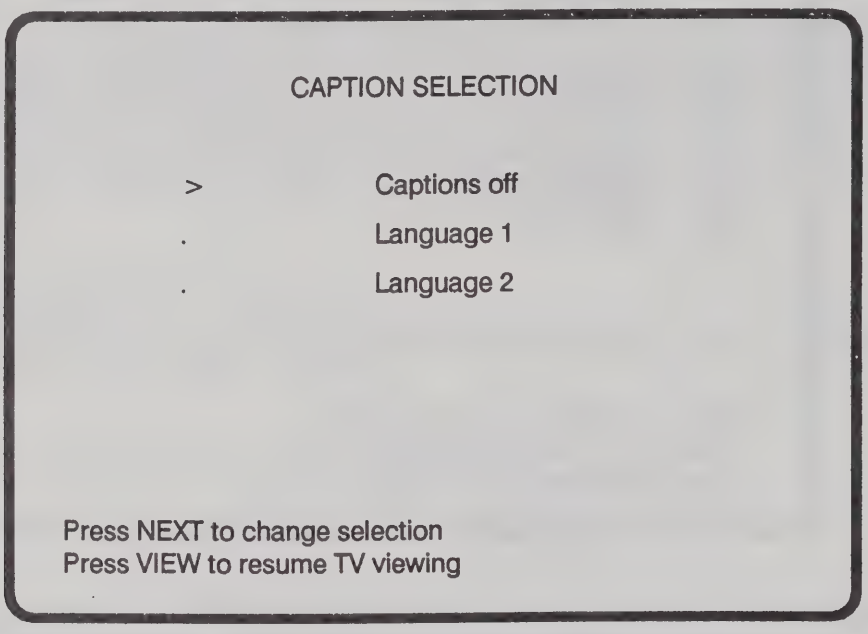

HELP SYSTEM ###
Teletext Operation:
The teletext service can be used to display general information. There are up to 1000 pages available to be displayed.
Each topic is directly addressable with a 3-digit number. In BTV mode, all pages are available with the text tier set.
Enter 3 digits to change topics
Press YES to return to the topic index
Press NEXT to view the next help page
Press VIEW to resume TV viewing

Press **YES** to return to the Teletext Index submenu at any time or press **VIEW** to return to normal viewing.

Caption Selection: Press 4

The Caption Selection submenu allows you to select one of two different caption languages or turn captions off. When power is turned on, 'Captions Off' is selected as shown below. The submenu below illustrates a typical Caption Selection screen.

Note: Check with your broadcaster to see if caption languages are supported.



To make a selection, press the **NEXT** button to move the pointer to the selection that you want. Then press **VIEW** to return to the program you were watching.

Example: To select Language 1, press NEXT to move the pointer to language 1. Then press VIEW to exit the menu and return to normal viewing.

SERVICE AND MAINTENANCE

PREVENTIVE MAINTENANCE

Periodically inspect the chassis for mechanical damage and evidence of overheating. The IRD should not be operated in environments where air flow is restricted or temperatures are outside the range of 0°C to 45°C.

Ensure that the chassis is free of dust and obstruction to allow proper ventilation in and around the unit. If necessary, vacuum the unit using a non-metallic brush, or wipe it with a soft cloth moistened with a glass cleaner. However, take care to avoid liquids or excess moisture from penetrating the unit. Do not insert any objects into the ventilation slots or damage or electric shock may result.

REPLACING THE FUSE

A 1.25A, 250V 3 AG fuse is installed on the rear panel to prevent electrical damage caused by power fluctuations. When defective, it must be replaced with an identical type and rating. The procedure for replacing the fuse is as follows:

1. Disconnect the power cord from the electrical outlet to avoid electrical shock.
2. Remove the fuseholder by turning it in the counterclockwise direction.
3. Remove the fuse from the holder, and replace with the same type and rating.
4. Insert the fuseholder into the fuse compartment and secure the fuseholder by turning it in the clockwise direction.

COMMON PROBLEMS AND HOW TO CORRECT THEM

Many reception problems are due to incorrect or deteriorated electrical conditions, and improper antenna orientation. These items should be checked first and if a problem still exists, then the guide in the table below may provide a solution to some common problems. If the problem still persists, consult your service center.

Diagnostics Guide

SYMPTOM	CAUSE	SOLUTION
Front panel display is off	IRD is OFF	Press ON/OFF button.
	IRD is unplugged	Check the power cord and electrical outlet.
	Blown fuse	Replace the fuse with same type and rating.
No signal	Channel setting	Check IF frequency, RF polarization and video polarity.

Diagnostics Guide (continued)

SYMPTOM	CAUSE	SOLUTION
No Signal (cont'd)	Channel setting does not match VHF modulator setting	Check that the VHF modulator match setting corresponds to the TV channel number. This is applicable to the modulated output signal only.
	Poor connection to LNB	Install and check cable. Measure the DC output voltage to the LNB. It should be 19V ±10%.
	Defective LNB	Contact manufacturer of LNB.
Poor quality picture and sound	Orientation of antenna	Aim antenna for peak reception according to manufacturer's instructions.
	Line-of-sight obstruction	Relocate antenna or remove obstruction.
	Poor connection or faulty cable to LNB	Check connectors and cables between IRD and LNB. Replace as necessary.
	RF polarization	Press **POL SEL** to switch polarization.
	RF polarization adjustment	Press **POL TRIM** and adjust setting using Δ and ∇ buttons for best picture.
Picture fine, but sound is poor	Incorrect audio subcarrier	Press **AUD TUNE** and adjust the frequency using Δ and ∇ buttons
Picture poor, but sound is fine	Video polarity is incorrect	Press **C/KU** to reverse the polarity.
IRD does not accept input from keypad	Front panel buttons are disabled	Lock level is set to **Loc2**. Check and set to level required.
Polar Rotor does not move	Poor connection	Check wiring.
	MPOL +5V output level is low at LNB	Reduce voltage drop by using heavier gauge wire.
	Polarizer is defective	Contact manufacturer of polarizer control.

SERVICE/REPAIR

If your Integrated Receiver/Decoder fails to operate according to specification, please call Scientific-Atlanta at the number below or contact your local dealer for assistance. You will be issued an RMA reference number prior to sending your unit for repair. All inquiries concerning service should be directed to Scientific-Atlanta at the following address:

Scientific-Atlanta Inc.
3845 Pleasantdale Rd., North Bldg.,
Atlanta, Georgia
30340 (404-903-2613)

APPENDIX A
PRE-PROGRAMMED CHANNEL SETTINGS

This appendix lists all the predefined frequency plans supported by the Model 9708 IRD. The following parameters have been set the same for all channels:

Audio Subcarrier	6.8 MHz
Polarizer H Trim	0
Polarizer V Trim	0
ON/OFF Switch	ON
Digital Subchannel	0

The acronyms used to define each plan are as follows:

- C - C Band frequency plan
- CInv - inverted C Band frequency plan
- 9704 - Model DR9704-2 IRD Ku Band frequency plan (default plan)
- GS - GSTAR 1, 2, 3, 4 Ku Band frequency plan
- SBS - SBS 1, 2, 3, 4 Ku Band frequency plan
- ASC - ASC Ku Band frequency plan
- GAL - Galaxy Ku Band frequency plan
- G4 - Galaxy 4 Ku Band frequency plan
- G7 - Galaxy 7 Ku Band frequency plan
- SPC1 - SPC1 Ku Band frequency plan
- T1 - T1 Ku Band frequency plan
- PAS - PAS C Band frequency plan
- FSS - FSS Ku Band frequency plan
- BSS - BSS Ku Band frequency plan
- BSA - BSA Ku Band frequency plan
- USEr - User defined frequency plan

The '9704' plan is the default frequency plan.

The user defined frequency plan is accessed by selecting the USEr plan. It can accommodate up to 99 channels. These channels are not defined in ROM. Each channel must be defined by the operator either via the front panel buttons or via the rear panel RS-232 (utility data) interface. To transmit tuning control commands to the IRD from a remote PC, request the "Model 9708 IRD Remote Serial Interface Communications Protocol" specification from Scientific-Atlanta for more information.

C Band Frequency Plan

CHANNEL	POLARITY	C BAND FREQ.	L BAND FREQ.
1	V	3,720 MHz	1,430 MHz
2	H	3,740 MHz	1,410 MHz
3	V	3,760 MHz	1,390 MHz
4	H	3,780 MHz	1,370 MHz
5	V	3,800 MHz	1,350 MHz
6	H	3,820 MHz	1,330 MHz
7	V	3,840 MHz	1,310 MHz
8	H	3,860 MHz	1,290 MHz
9	V	3,880 MHz	1,270 MHz
10	H	3,900 MHz	1,250 MHz
11	V	3,920 MHz	1,230 MHz
12	H	3,940 MHz	1,210 MHz
13	V	3,960 MHz	1,190 MHz
14	H	3,980 MHz	1,170 MHz
15	V	4,000 MHz	1,150 MHz
16	H	4,020 MHz	1,130 MHz
17	V	4,040 MHz	1,110 MHz
18	H	4,060 MHz	1,090 MHz
19	V	4,080 MHz	1,070 MHz
20	H	4,100 MHz	1,050 MHz
21	V	4,120 MHz	1,030 MHz
22	H	4,140 MHz	1,010 MHz
23	V	4,160 MHz	990 MHz
24	H	4,180 MHz	970 MHz

CInv C Band Frequency Plan

CHANNEL	POLARITY	C BAND FREQ.	L BAND FREQ.
1	H	3,720 MHz	1,430 MHz
2	V	3,740 MHz	1,410 MHz
3	H	3,760 MHz	1,390 MHz
4	V	3,780 MHz	1,370 MHz
5	H	3,800 MHz	1,350 MHz
6	V	3,820 MHz	1,330 MHz
7	H	3,840 MHz	1,310 MHz
8	V	3,860 MHz	1,290 MHz
9	H	3,880 MHz	1,270 MHz
10	V	3,900 MHz	1,250 MHz
11	H	3,920 MHz	1,230 MHz
12	V	3,940 MHz	1,210 MHz
13	H	3,960 MHz	1,190 MHz
14	V	3,980 MHz	1,170 MHz
15	H	4,000 MHz	1,150 MHz
16	V	4,020 MHz	1,130 MHz
17	H	4,040 MHz	1,110 MHz
18	V	4,060 MHz	1,090 MHz
19	H	4,080 MHz	1,070 MHz
20	V	4,100 MHz	1,050 MHz
21	H	4,120 MHz	1,030 MHz
22	V	4,140 MHz	1,010 MHz
23	H	4,160 MHz	990 MHz
24	V	4,180 MHz	970 MHz

9704 Ku Band Frequency Plan (same as used in Model DR9704-2 IRD)

CHANNEL	POLARITY	Ku BAND FREQ.	L BAND FREQ.
1	H	11,730 MHz	980 MHz
2	H	11,791 MHz	1,041 MHz
3	H	11,852 MHz	1,102 MHz
4	H	11,913 MHz	1,163 MHz
5	H	11,974 MHz	1,224 MHz
6	H	12,035 MHz	1,285 MHz
7	H	12,096 MHz	1,346 MHz
8	H	12,157 MHz	1,407 MHz
9	V	11,744 MHz	994 MHz
10	V	11,805 MHz	1,055 MHz
11	V	11,866 MHz	1,116 MHz
12	V	11,927 MHz	1,177 MHz
13	V	11,988 MHz	1,238 MHz
14	V	12,049 MHz	1,299 MHz
15	V	12,110 MHz	1,360 MHz
16	V	12,171 MHz	1,421 MHz
17	H	11,725 MHz	975 MHz
18	H	11,774 MHz	1,024 MHz
19	H	11,823 MHz	1,073 MHz
20	H	11,872 MHz	1,122 MHz
21	H	11,921 MHz	1,171 MHz
22	H	11,970 MHz	1,220 MHz
23	H	12,019 MHz	1,269 MHz
24	H	12,068 MHz	1,318 MHz
25	H	12,117 MHz	1,367 MHz
26	H	12,166 MHz	1,416 MHz

GSTAR 1, 2, 3, 4 Ku Band Frequency Plan

CHANNEL	POLARITY	Ku BAND FREQ.	L BAND FREQ.
1	H	11,730 MHz	980 MHz
2	H	11,791 MHz	1,041 MHz
3	H	11,852 MHz	1,102 MHz
4	H	11,913 MHz	1,163 MHz
5	H	11,974 MHz	1,224 MHz
6	H	12,035 MHz	1,285 MHz
7	H	12,096 MHz	1,346 MHz
8	H	12,157 MHz	1,407 MHz
9	V	11,744 MHz	994 MHz
10	V	11,805 MHz	1,055 MHz
11	V	11,866 MHz	1,116 MHz
12	V	11,927 MHz	1,177 MHz
13	V	11,988 MHz	1,238 MHz
14	V	12,049 MHz	1,299 MHz
15	V	12,110 MHz	1,360 MHz
16	V	12,171 MHz	1,421 MHz

SBS 2, 3, 4, 5, 6 Ku Band Frequency Plan

CHN	SBS 2, 3, 4, 5 XPDR	SBS 6 XPDR	Ku BAND FREQ.	L BAND FREQ.
1	1H	1H	11,725.0 MHz	975.0 MHz
2	2H	3H	11,774.0 MHz	1,024.0 MHz
3	3H	5H	11,823.0 MHz	1,073.0 MHz
4	4H	7H	11,872.0 MHz	1,122.0 MHz
5	5H	9H	11,921.0 MHz	1,171.0 MHz
6	6H	11H	11,970.0 MHz	1,220.0 MHz
7	7H	13H	12,019.0 MHz	1,269.0 MHz
8	8H	15H	12,068.0 MHz	1,318.0 MHz
9	9H	17H	12,117.0 MHz	1,367.0 MHz
10	10H	19H	12,166.0 MHz	1,416.0 MHz
11		2V	11,749.5 MHz	999.5 MHz
12		4V	11,798.5 MHz	1,048.5 MHz
13		6V	11,847.5 MHz	1,097.5 MHz
14		8V	11,896.5 MHz	1,146.5 MHz
15		10V	11,945.5 MHz	1,195.5 MHz
16		12V	11,994.5 MHz	1,244.5 MHz
17		14V	12,043.5 MHz	1,293.5 MHz
18		16V	12,092.5 MHz	1,342.5 MHz
19		18V	12,141.5 MHz	1,391.5 MHz

ASC Ku Band Frequency Plan

CHANNEL	POLARITY	Ku BAND FREQ.	L BAND FREQ.
19	H	11,740.0 MHz	990.0 MHz
20	H	11,820.0 MHz	1,070.0 MHz
21	H	11,900.0 MHz	1,150.0 MHz
22	H	11,980.0 MHz	1,230.0 MHz
23	H	12,060.0 MHz	1,310.0 MHz
24	H	12,140.0 MHz	1,390.0 MHz
25	H	11,774.5 MHz	1,024.5 MHz
26	H	11,835.5 MHz	1,085.5 MHz
27	H	11,896.5 MHz	1,146.5 MHz
28	H	11,957.5 MHz	1,207.5 MHz
29	H	12,018.5 MHz	1,268.5 MHz
30	H	12,079.5 MHz	1,329.5 MHz
31	H	12,140.5 MHz	1,390.5 MHz
32	V	11,744.0 MHz	994.0 MHz
33	V	11,805.0 MHz	1,055.0 MHz
34	V	11,866.0 MHz	1,116.0 MHz
35	V	11,927.0 MHz	1,177.0 MHz
36	V	11,988.0 MHz	1,238.0 MHz
37	V	12,049.0 MHz	1,299.0 MHz
38	V	12,110.0 MHz	1,360.0 MHz
39	V	12,171.0 MHz	1,421.0 MHz

GAL Ku Band Frequency Plan

CHANNEL	POLARITY	Ku BAND FREQ.	L BAND FREQ.
1	H	11,729.0 MHz	979.0 MHz
2	V	11,758.5 MHz	1,008.5 MHz
3	H	11,788.0 MHz	1,038.0 MHz
4	V	11,817.5 MHz	1,067.5 MHz
5	H	11,847.0 MHz	1,097.0 MHz
6	V	11,876.5 MHz	1,126.5 MHz
7	H	11,906.0 MHz	1,156.0 MHz
8	V	11,935.5 MHz	1,185.5 MHz
9	H	11,965.0 MHz	1,215.0 MHz
10	V	11,994.5 MHz	1,244.5 MHz
11	H	12,024.0 MHz	1,274.0 MHz
12	V	12,053.5 MHz	1,303.5 MHz
13	H	12,083.0 MHz	1,333.0 MHz
14	V	12,112.5 MHz	1,362.5 MHz
15	H	12,142.0 MHz	1,392.0 MHz
16	V	12,171.5 MHz	1,421.5 MHz

Galaxy 4 Ku Band Frequency Plan

CHANNEL	POLARITY	KU BAND FREQ.	L BAND FREQ.
1	V	11,915 MHz	1,165 MHz
2	V	11,945 MHz	1,195 MHz
3	V	11,976 MHz	1,226 MHz
4	V	12,005 MHz	1,255 MHz
5	V	12,035 MHz	1,285 MHz
6	V	12,065 MHz	1,315 MHz
7	V	12,095 MHz	1,345 MHz
8	V	12,125 MHz	1,375 MHz
9	V	12,155 MHz	1,405 MHz
10	V	12,185 MHz	1,435 MHz
11	H	11,720 MHz	970 MHz
12	H	11,750 MHz	1,000 MHz
13	H	11,780 MHz	1,030 MHz
14	H	11,810 MHz	1,060 MHz
15	H	11,840 MHz	1,090 MHz
16	H	11,870 MHz	1,120 MHz
17	H	11,900 MHz	1,150 MHz
18	H	11,930 MHz	1,180 MHz
19	H	11,960 MHz	1,210 MHz
20	H	11,991 MHz	1,241 MHz
21	H	12,020 MHz	1,270 MHz
22	H	12,050 MHz	1,300 MHz
23	H	12,080 MHz	1,330 MHz
24	H	12,110 MHz	1,360 MHz
25	H	12,140 MHz	1,390 MHz
26	H	12,170 MHz	1,420 MHz
27	V	11,795 MHz	1,045 MHz
28	V	11,825 MHz	1,075 MHz
29	V	11,855 MHz	1,105 MHz
30	V	11,885 MHz	1,135 MHz

Galaxy 7 Ku Band Frequency Plan

CHANNEL	POLARITY	Ku BAND FREQ.	L BAND FREQ.
1	H	11,915 MHz	1,165 MHz
2	H	11,945 MHz	1,195 MHz
3	H	11,976 MHz	1,226 MHz
4	H	12,005 MHz	1,255 MHz
5	H	12,035 MHz	1,285 MHz
6	H	12,065 MHz	1,315 MHz
7	H	12,095 MHz	1,345 MHz
8	H	12,125 MHz	1,375 MHz
9	H	12,155 MHz	1,405 MHz
10	H	12,185 MHz	1,435 MHz
11	V	11,720 MHz	970 MHz
12	V	11,750 MHz	1,000 MHz
13	V	11,780 MHz	1,030 MHz
14	V	11,810 MHz	1,060 MHz
15	V	11,840 MHz	1,090 MHz
16	V	11,870 MHz	1,120 MHz
17	V	11,900 MHz	1,150 MHz
18	V	11,930 MHz	1,180 MHz
19	V	11,960 MHz	1,210 MHz
20	V	11,991 MHz	1,241 MHz
21	V	12,020 MHz	1,270 MHz
22	V	12,050 MHz	1,300 MHz
23	V	12,080 MHz	1,330 MHz
24	V	12,110 MHz	1,360 MHz
25	V	12,140 MHz	1,390 MHz
26	V	12,170 MHz	1,420 MHz

SPC1 Ku Band Frequency Plan

CHANNEL	POLARITY	Ku BAND FREQ.	L BAND FREQ.
1	H	11,725 MHz	975 MHz
2	H	11,774 MHz	1,024 MHz
3	H	11,823 MHz	1,073 MHz
4	H	11,872 MHz	1,122 MHz
5	H	11,921 MHz	1,171 MHz
6	H	11,970 MHz	1,220 MHz
7	H	12,019 MHz	1,269 MHz
8	H	12,068 MHz	1,318 MHz
9	H	12,117 MHz	1,367 MHz
10	H	12,166 MHz	1,416 MHz
11	H	11,730 MHz	980 MHz
12	H	11,779 MHz	1,029 MHz
13	H	11,828 MHz	1,078 MHz
14	H	11,877 MHz	1,127 MHz
15	H	11,926 MHz	1,176 MHz
16	H	11,975 MHz	1,225 MHz
17	H	12,024 MHz	1,274 MHz
18	H	12,073 MHz	1,323 MHz
19	H	12,122 MHz	1,372 MHz
20	H	12,171 MHz	1,421 MHz

T1 Ku Band Frequency Plan

CHANNEL	POLARITY	Ku BAND FREQ.	L BAND FREQ.
1	H	12,096.5 MHz	1,346.5 MHz
2	H	12,024.0 MHz	1,274.0 MHz
3	H	11,780.0 MHz	1,030.0 MHz
4	V	11,817.5 MHz	1,067.5 MHz
5	V	11,935.5 MHz	1,185.5 MHz
6	V	12,053.5 MHz	1,303.5 MHz
7	V	12,171.5 MHz	1,421.5 MHz
8	V	11,758.5 MHz	1,008.5 MHz
9	V	11,876.5 MHz	1,126.5 MHz
10	V	11,994.5 MHz	1,244.5 MHz
11	H	11,860.0 MHz	1,110.0 MHz
12	H	11,900.0 MHz	1,150.0 MHz
13	H	12,140.0 MHz	1,390.0 MHz
14	H	11,976.0 MHz	1,226.0 MHz
15	H	11,740.0 MHz	990.0 MHz

PAS C Band Frequency Plan

CHANNEL	POLARITY	C BAND FREQ.	L BAND FREQ.
1	V	3,723 MHz	1,427 MHz
2	V	3,798 MHz	1,352 MHz
3	V	3,840 MHz	1,310 MHz
4	H	3,900 MHz	1,250 MHz
5	V	3,883 MHz	1,267 MHz
6	V	4,120 MHz	1,030 MHz
7	V	3,998 MHz	1,152 MHz
8	H	3,720 MHz	1,430 MHz
9	V	3,740 MHz	1,410 MHz
10	H	3,760 MHz	1,390 MHz
11	V	3,780 MHz	1,370 MHz
12	H	3,800 MHz	1,350 MHz
13	H	3,830 MHz	1,320 MHz
14	H	3,850 MHz	1,300 MHz
15	V	3,880 MHz	1,270 MHz
16	V	4,020 MHz	1,130 MHz
17	V	3,920 MHz	1,230 MHz
18	H	3,740 MHz	1,410 MHz
19	H	3,982 MHz	1,168 MHz
20	H	4,140 MHz	1,010 MHz
21	H	3,940 MHz	1,210 MHz
22	H	3,950 MHz	1,200 MHz
23	H	3,950 MHz	1,200 MHz
24	V	3,950 MHz	1,200 MHz
25	V	3,950 MHz	1,200 MHz
26	V	3,950 MHz	1,200 MHz

FSS Ku Band Frequency Plan

CHANNEL	POLARITY	Ku BAND FREQ.	L BAND FREQ.
1	H	12,096.5 MHz	1,346.5 MHz
2	H	12,024.0 MHz	1,274.0 MHz
3	H	11,780.0 MHz	1,030.0 MHz
4	V	11,807.5 MHz	1,067.5 MHz
5	V	11,935.5 MHz	1,185.5 MHz
6	V	12,053.5 MHz	1,303.5 MHz
7	V	12,171.5 MHz	1,421.5 MHz
8	V	11,758.5 MHz	1,008.5 MHz
9	V	11,876.5 MHz	1,126.5 MHz
10	V	11,994.5 MHz	1,244.5 MHz
11	H	11,860.0 MHz	1,110.0 MHz
12	H	11,900.0 MHz	1,150.0 MHz
13	H	12,140.0 MHz	1,390.0 MHz
14	H	11,976.0 MHz	1,226.0 MHz
15	H	11,740.0 MHz	990.0 MHz
16	H	12,112.5 MHz	1362.5 MHz

BSS Ku Band Frequency Plan

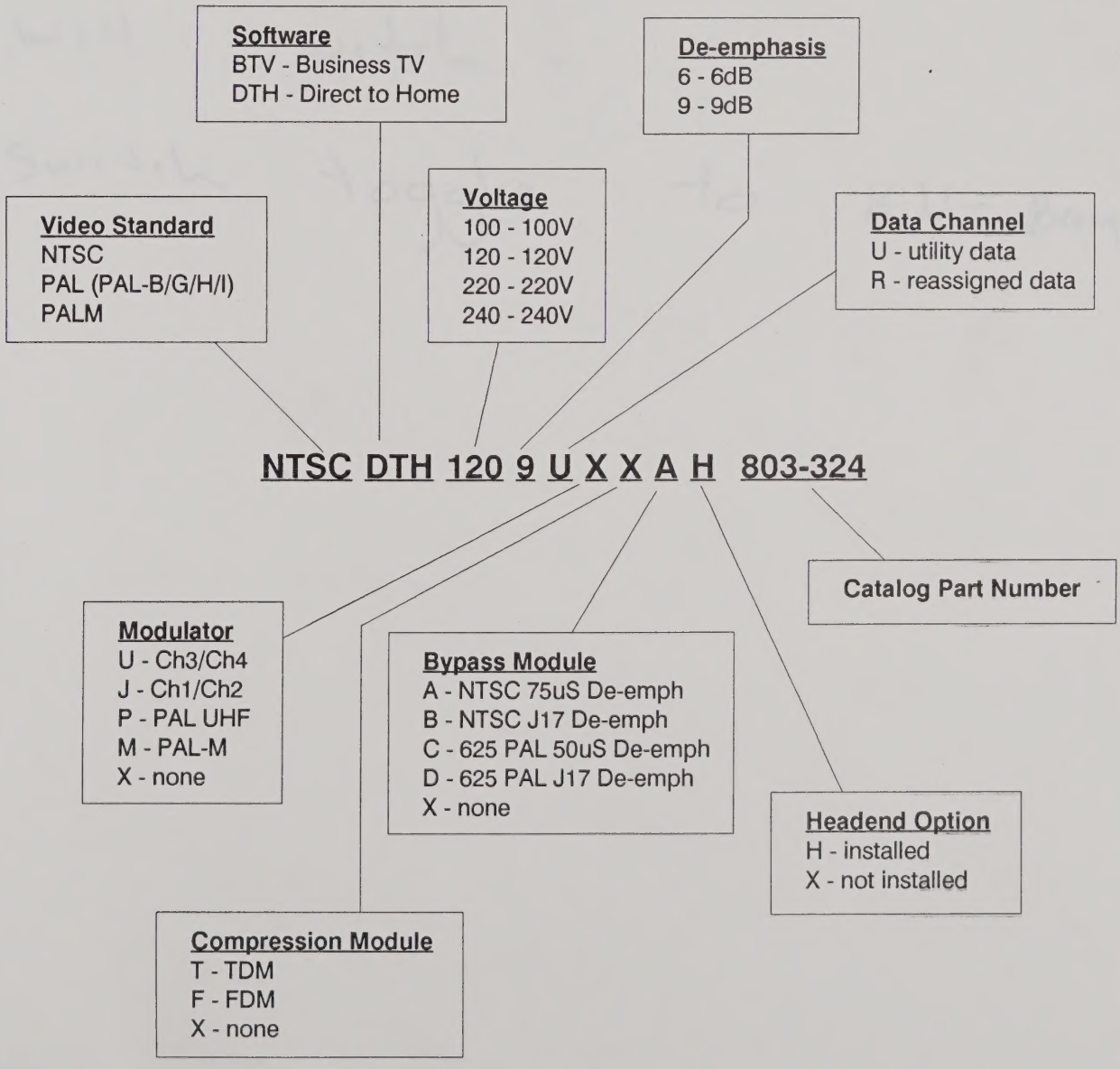
CHANNEL	POLARITY	Ku BAND FREQ.	L BAND FREQ.
1	H	11,724.0 MHz	974.0 MHz
2	V	11,738.6 MHz	988.6 MHz
3	H	11,753.2 MHz	1,003.2 MHz
4	V	11,767.7 MHz	1,017.7 MHz
5	H	11,782.3 MHz	1,032.3 MHz
6	V	11,796.9 MHz	1,046.9 MHz
7	H	11,811.5 MHz	1,061.5 MHz
8	V	11,826.1 MHz	1,076.1 MHz
9	H	11,840.6 MHz	1,090.6 MHz
10	V	11,855.2 MHz	1,105.2 MHz
11	H	11,869.8 MHz	1,119.8 MHz
12	V	11,884.4 MHz	1,134.4 MHz
13	H	11,899.0 MHz	1,149.0 MHz
14	V	11,913.5 MHz	1,163.5 MHz
15	H	11,928.0 MHz	1,178.1 MHz
16	V	11,942.7 MHz	1,192.7 MHz
17	H	11,957.3 MHz	1,207.3 MHz
18	V	11,971.9 MHz	1,221.9 MHz
19	H	11,986.4 MHz	1,236.4 MHz
20	V	12,001.0 MHz	1,251.0 MHz
21	H	12,006.6 MHz	1,265.6 MHz
22	V	12,030.2 MHz	1,280.2 MHz
23	H	12,044.8 MHz	1,294.8 MHz
24	V	12,059.3 MHz	1,309.3 MHz
25	H	12,073.9 MHz	1,323.9 MHz
26	V	12,088.5 MHz	1,338.5 MHz
27	H	12,103.1 MHz	1,353.1 MHz
28	V	12,117.7 MHz	1,367.7 MHz
29	H	12,132.2 MHz	1,382.2 MHz
30	V	12,146.8 MHz	1,396.8 MHz
31	H	12,161.4 MHz	1,411.4 MHz
32	V	12,176.0 MHz	1,426.0 MHz

BSA Ku Band Frequency Plan

CHANNEL	POLARITY	Ku BAND FREQ.	L BAND FREQ.
1	V	11,724.0 MHz	974.0 MHz
2	H	11,738.6 MHz	988.6 MHz
3	V	11,753.2 MHz	1,003.2 MHz
4	H	11,767.7 MHz	1,017.7 MHz
5	V	11,782.3 MHz	1,032.3 MHz
6	H	11,796.9 MHz	1,046.9 MHz
7	V	11,811.5 MHz	1,061.5 MHz
8	H	11,826.1 MHz	1,076.1 MHz
9	V	11,840.6 MHz	1,090.6 MHz
10	H	11,855.2 MHz	1,105.2 MHz
11	V	11,869.8 MHz	1,119.8 MHz
12	H	11,884.4 MHz	1,134.4 MHz
13	V	11,899.0 MHz	1,149.0 MHz
14	H	11,913.5 MHz	1,163.5 MHz
15	V	11,928.0 MHz	1,178.1 MHz
16	H	11,942.7 MHz	1,192.7 MHz
17	V	11,957.3 MHz	1,207.3 MHz
18	H	11,971.9 MHz	1,221.9 MHz
19	V	11,986.4 MHz	1,236.4 MHz
20	H	12,001.0 MHz	1,251.0 MHz
21	V	12,006.6 MHz	1,265.6 MHz
22	H	12,030.2 MHz	1,280.2 MHz
23	V	12,044.8 MHz	1,294.8 MHz
24	H	12,059.3 MHz	1,309.3 MHz
25	V	12,073.9 MHz	1,323.9 MHz
26	H	12,088.5 MHz	1,338.5 MHz
27	V	12,103.1 MHz	1,353.1 MHz
28	H	12,117.7 MHz	1,367.7 MHz
29	V	12,132.2 MHz	1,382.2 MHz
30	H	12,146.8 MHz	1,396.8 MHz
31	V	12,161.4 MHz	1,411.4 MHz
32	H	12,176.0 MHz	1,426.0 MHz

APPENDIX B
PRODUCT IDENTIFICATION

The label in the center of the rear panel contains a number of product identification numbers, including the User Address (UA). The 16-digit packed product number + catalog part number identify your unit and the options which it contains. The Catalog Part Number is a reference number related to the packed product number. The illustration below identifies all the combinations available. Use this diagram to determine your IRD configuration.



C band or KU band Satelites.

* push channel & tune at same time
* lights flash
* press Frequ. plan.
* to "user" press store (will switch)
* switch toggle to KU-Band